DOCUMENT RESUME

ED 043 585 24 SP 004 262

TITLE	Wisconsin Elementary Teacher Education Project. Volume VI, Feasibility Study: Pricing and Economic Analysis Study. Final Report.
INSTITUTION	Wisconsin Univ., Madison.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR-9-0421
PUB DATE	Dec 69
CONTRACT	OEC-0-9-590421-4046
NOTE	186p.; Phase 2, Feasibility Study, CETEM
AVAILABLE FROM	Supt. of Docs., Government Printing Office, Washington, D.C. 20402 (Vol VI, HE5.87:w75/v.6, $2.00)
EDRS PRICE	EDRS Price MF-$0.75 HC-$9.40
DESCRIPTORS	Cost Effectiveness, Educational Finance, *Educational Planning, Educational Strategies, Financial Policy, *Operations Research, *Program Budgeting, *Program Planning, *Resource Allocations, Salaries, Staff Utilization
IDENTIFIERS	CETEM, *Comprehensive Elementary Teacher Education Models

ABSTRACT

This document is the second volume of the feasibility study report for the Wisconsin Elementary Teacher Education Project. It provides in part 1 data on program, planning and budgeting, including cost figures for preparing students in the present and new programs, marginal expenses, and costs for implementing the program on other campuses. Part 2 is an economic analysis of the project, which attempts to provide an objective view of the whole program. It consists of 1) a cost-effectiveness analysis of selection of media for presentation of sound motion pictures, and of instructional staff requirements; 2) benefit analysis, cost analysis, comparison of benefits and costs, and benefit-cost analysis conclusions; and 3) economic analysis conclusions. There are eight appendixes which provide 1) notes on the pricing of the current program; 2) depreciation and lease costs; 3) calculations of staff salaries; 4) cost of supplies and capital equipment; 5) procedures for calculation of office and instructional space; 6) calculation of cost of office and instructional space; 7) explanation of cost-of-education index; and 8) staff resources required for the operation of the program in 1975-1976. A related document is SP 004 263. (MBM)

ED0 43585

Final Report
Project No. 9-0421
Contract No. OEC-0-9-590421-4046

WISCONSIN ELEMENTARY TEACHER EDUCATION PROJECT

Volume VI

FEASIBILITY STUDY: PRICING AND ECONOMIC ANALYSIS

Donald J. McCarty
Principal Investigator

M. Vere DeVault
John M. Kean
Co-Directors

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

University of Wisconsin
Madison, Wisconsin

December 31, 1969

The research reported herein was performed pursuant to a contract with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Office of Education
Bureau of Research

SP004262

PREFACE

The Wisconsin Elementary Teacher Education Project (WETEP) is an extensive inclusive undertaking designed to create new patterns for teacher education. The project began in December of 1967 and is being planned for full implementation during the 1975-76 school year. The project is planned in three phases. Phase I, completed in March, 1969, was concerned with the development of detailed specifications for the various components of the instructional program. The work of the first phase is represented in the first four volumes of the WETEP series. The present report is the result of extensive efforts during the eight-month period between May 1, 1969 and December 31, 1969. Phase III implementation is intended to span a period from 1970 through 1976.

Phase II of the WETEP program is a feasibility study focused primarily on the extension of specifications delineated in the first four volumes, in the identification of benefits to be derived from the implementation of those specifications, in the definition of support systems required for an operational WETEP, in the pricing of development and operation of WETEP, and finally in an economic analysis designed to determine the feasibility of the total project. The total Phase II Feasibility Study is reported in Volume V (Feasibility Study: Program and Support Systems) and Volume VI (Feasibility Study: Pricing and Economic Analysis).

Although economic analyses of a variety of projects in the public sector have in recent years become increasingly essential, little effort in this direction in educational projects has been in evidence. The implications of the extensive feasibility study directed toward the economic analysis of WETEP are far reaching. The extensive involvement of faculty, staff, and students in education, in school finance, in economics, and in the central administration of the University attests to the anticipated impact of this study throughout the university community.

The successful development of WETEP will continue to require support from a large segment of the University faculty and administration, although the essential responsibility for the nature of the WETEP project resides with the WETEP faculty. Other resources beyond those available from within the University structure have been organized to give leadership and support to various aspects of the project. One such resource is represented by the State Department of Public Instruction and the school systems which have become a part of the enlarged cooperative WETEP effort. Radio Corporation of America is committed to continuing support in the development and implementation of WETEP beyond the planning stage and feasibility study to which they have contributed in a variety of significant ways.

This report is a result of the cooperative efforts of numerous faculty and staff members associated with WETEP. Many of these persons are identified as WETEP committee members in the staff listing. Others are identified as authors of specific reports included in these volumes. Nonetheless, many persons, including authors, consultants, readers, editors and typists have not been credited with their special contributions to the success of this project. Our indebtedness to each of these is recognized and our appreciation is expressed to all who have assisted in whatever way.

Special mention should be made here of the contributions of Deanne Olsen and Mary Krohlow as copy editors for many of the papers in Volumes V and VI. Appreciation is also expressed to Paul Knipping for his excellent service as staff photographer. Special appreciation is expressed to Jan Jones who has served as secretary and office manager for WETEP since its initiation twenty-five months ago.

M. Vere DeVault
John M. Kean
  Co-Directors

December, 1969

WETEP STAFF

Administration

Donald J. McCarty, Dean of the School of Education,
Principal Investigator
M. Vere DeVault, Professor of Curriculum and Instruction,
Co-Director
John M. Kean, Associate Professor of Curriculum and Instruction,
Co-Director
Lond Rodman, Director, Bureau of Teacher Education and Certification,
Department of Public Instruction, State of Wisconsin
Robert G. Petzold, Associate Dean of the School of Education
Dan W. Andersen, Assistant Dean of the School of Education
Bryant E. Kearl, Vice Chancellor
Stephen C. Kleene, Dean of the College of Letters and Science
Robert Carbone, Assistant to the President
Eric Rude, Associate Dean of the Graduate School
Carl R. Personke, Chairman, Elementary Teacher Education Committee

Committees

Input: Screening/Orientation

Dan W. Andersen, Chairman
Jo Ellen Carone*
John Cavanaugh*
Josiah Dilley*
Norman DePillo*
Harlan Hansen
Diane Kreft*
Ellen Passen*

Educational Psychology

Robert Grinder, Chairman
T. Anne Cleary
Margaret Clifford*
Robert Davidson
Gary Davis
Nancy Elson
Frank Farley
Herbert Klausmeier
Thomas Ringness
Jay Shores*

Mathematics

J. Fred Weaver, Chairman
M. Vere DeVault
John Harvey
George Henderson
Edward Himes*
Thomas Kriewall*
John LeBlanc#
Marshall Osborn
Thomas Romberg
Joseph Rousseau*
Henry Van Engen

Science

Calvin Gale, Chairman
Ronald Anderson*
Herbert Clarke
Kenneth Dowling
Gerald McVey
George O'Hearn

---

*Denotes Graduate or Undergraduate Student
#Denotes Visiting Professor

Communications

Carl R. Personke, Chairman
Thomas Barrett
Maxine Goldberg*
John M. Kean
Elizabeth Lowe*
Elaine Vilscek

Social Studies

B. Robert Tabachnick, Chairman
Dan W. Andersen
Donald Ferris#

Curriculum and Instruction

Theodore Czajkowski, Chairman
Margaret Ammons
Eugene Balts
Donna Chandler*
Jacqueline Hass*
Kenneth Howey
Dorothy Huenecke*
Donald Lange
Robert Moser
Carl R. Personke
Karen Skuldt*
Ruth Vaughn*

Performing Arts

Virginia Chambers, Music
Robert Folstrom, Music
Hardean Naeseth, Art
Ronald Neperud, Art

Health, Safety and Leisure

C. Frazier Damron, Safety
H. Clifton Hutchins, Leisure
Paul Knipping, Health*
Warren H. Southworth, Health

Guidance

Philip Perrone, Chairman
Dan W. Andersen
Josiah Dilley
Ray Hosford

Physical Education

Marie Mullan, Chairman
Roberta Bennett
Ann Carr
Ann E. Jewett
Sarah Robinson
Marie Weber

Culturally Diverse

John Antes, Chairman
Roland Belisle*
Robert Crumpton*
John M. Kean
B. Robert Tabachnick

Media and Technology

Charles D. Sullivan, Chairman
Frank Baker
H. Baptistine Brownyard
William Bush
Mina Ghattas*
Harlan Hansen
Maurice Iverson
Donald McIsaac
Gerald McVey
Lola Pierstorff
Meredith Rousseau
John Wentworth
Frederick White
Lynn Yeazel

Early Childhood Education

David C. Davis, Co-Chairman
Helen Dawe, Co-Chairman
Robert Clasen
Nancy Elson
Robert Grinder
Harlan Hansen
Martin Loeb
Jean Mueller

Behavioral Objectives

Thomas Barrett, Chairman
Margaret Ammons
Nancy Elson

Special Education

James Billingsley, Chairman
George Baker
Dave Geske
Rick Heber
James McCarthy
Harold Schmidt

Position Papers

John M. Kean, Chairman
Margaret Ammons
Thomas Barrett
B. Robert Tabachnick

Space Facilities

Thomas Barrett, Chairman
M. Vere DeVault
Stewart North
Meredith Rousseau

Systems Development

Albert H. Yee, Chairman
Robert Cleary
Jay Shores*
Karen Skuldt*
Charles D. Sullivan
B. Robert Tabachnick

Assessment

Anne Cleary, Chairman
Anne Buchanan
Robert Cleary
William Coffman
Robert Grinder
Thomas Kriewall*
Robert Linn
Donald Rock
Albert H. Yee

Committee for Cooperating Schools

M. Vere DeVault, Chairman
Margaret Ammons
Dan W. Andersen
Donald Black, Downers Grove, Ill.
Theodore Czajkowski
Charles Elmlinger, Downers Grove, Ill.
John Gunning, Racine
Kenneth Jensen, Racine
William Monahan, Freeport, Ill.
Douglas Ritchie, Madison
Gordon Rodeen, McFarland
James Stoltenberg, Merrill

Management and Cost Analysis

LeRoy Peterson, Chairman
Kay Andersen
Elwin Cammack
M. Vere DeVault
Thomas Flygare*
Mary A. Golladay
Sharon Hueckel
John M. Kean
Steven Koch*
Donald McIsaac
Stewart North
Meredith Rousseau
Karen Skuldt*
Georgia Turner

Futuristics and Education

Fred Newmann, Chairman
John M. Kean
B. Robert Tabachnick
Albert H. Yee

Special Consultants

Elwin Cammack, Coordinator, Institutional Studies
Frederick L. Golladay, Assistant Professor of Economics
David H. Gustafson, Assistant Professor of Mechanical Engineering
Mervin E. Muller, Professor of Computer Sciences, Director of the Computing Center
Gerald Nadler, Professor of Mechanical Engineering
Gustave Rath, Chairman, Design and Development Center, the Technological Institute, Northwestern University
Wayne F. Rayfield, Associate Director, Computing Center
E. James Robertson, Director, Radio/TV/Film

Information Consultants

Sam Falci, Assistant to the Dean for Business Affairs
Glenn A. Jensen, Assistant Controller, Central Administration
Horst W. Lobe, Campus Planning
Michael R. McArdle, Coordinator, Office of Clinical Experiences for Teachers
Gerald McVey, Coordinator, Multi-media Instructional Laboratory
Julius Mintz, Student Statistics, Office of Registrar
Robert P. Moser, Former Director, Office of Clinical Experiences for Teachers
Edna Paske, Administrative Assistant, Teacher Placement Bureau
Lola R. Pierstorff, Director, Instructional Materials Center
Robert Sager, Data Analyst, Space Management Agency

CONTENTS

Page

PREFACE iii

WETEP STAFF v

LIST OF TABLES xi

LIST OF FIGURES xv

PART I 1

INTRODUCTION TO PRICING 3
Leroy J. Peterson

PRICING THE PRESENT PROGRAM 9
Leroy J. Peterson and Thomas J. Flygare

- Introduction 11
- The Present Elementary Teacher Education Program: A Cost Analysis 11
- Cost of Present Program 13
- Reclassification to WETEP Elements 14
- Projection of Present Program Costs 21
- The Present Program During the Implementation of WETEP . . . 30
- Sources of Data and Information 33

PRICING WETEP DEVELOPMENT 35
Leroy J. Peterson and Thomas J. Flygare

- Introduction 37
- Module Development 37
- Pricing WETEP Support Systems During Development Phase . . . 54
- Pricing Additional WETEP Support Systems 81
- Summary of All WETEP Development Costs 81

PRICING OF WETEP OPERATION ON THE MADISON CAMPUS 89
Leroy J. Peterson and Steven M. Kock

- Introduction 91
- Pricing of WETEP on the Madison Campus 91
- Operational Costs Concurrent with Development 92
- Pricing of WETEP Operations 1975-76 94
  - Cost of WETEP Support Systems 98
  - Cost of Element Operation on the Madison Campus 98
  - Cost of Operation of Technological Facilities 98
- Extension of WETEP to Other Colleges and Universities . . . 99
- Summary 99

Page

PART II. 101

AN ECONOMIC ANALYSIS OF THE WISCONSIN ELEMENTARY TEACHER EDUCATION PROJECT. 103
Mary A. Golladay

Cost-Effectiveness Analysis Within WETEP. 107
  A Cost-Effectiveness Analysis of Selection of Media for Presentation of Sound Motion Pictures 108
  A Cost-Effectiveness Analysis of Instructional Staff Requirements 110
  Summary. 111
A Benefit-Cost Analysis of WETEP. 112
  Benefit Analysis 114
  Cost Analysis. 132
  Comparison of WETEP Benefits and Costs 138
  Benefit-Cost Analysis Conclusions. 148
Economic Analysis Conclusions 149

APPENDICES 151

I Notes for Table II in "Pricing of Current Program". . . . 153

II Depreciation and Lease Costs. 163

III Calculation of Salaries of Professional Staff, Post Doctorate Interns, Research Assistants, Teaching Assistants, Consultants and Secretarial Staff. . . . 169

IV Cost of Supplies and Capital Equipment. 173

V Procedures for Calculation of Square Footage of Office and Instructional Space, Both University Owned and Leased 177

VI Calculation of Cost of Office and Instructional Space, Both University Owned and Leased 181

VII Explanation of the Cost-of-Education Index. 185

VIII Staff Resources Required for Operation of the WETEP Program 1975-76. 189

LIST OF TABLES

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program, 1967-68) 15

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1967-68) 17

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1968-69) 22

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1969-70) 23

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1970-71) 24

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1971-72) 25

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1972-73) 26

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1973-74) 27

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1974-75) 28

Cost Within the University of Wisconsin School of Education for the Preparation of One Elementary Teacher Candidate (Present Program in WETEP Categories, 1975-76) 29

Cost of Present Program in Actual Dollars as WETEP is Implemented . . 31

Cost of Present Program in Constant 1968-69 Dollars as WETEP is Implemented 32

Schedule of Module Development Showing Mid-Year of 3-Year Development Period for Each Module 39

Personnel Requirement (Exclusive of Technological Personnel) for the Development of WETEP Modules 41

Cost of Module Development by Element in Actual Dollars, 1970-71. . 43

Cost of Module Development by Element in Actual Dollars, 1971-72. . 44

Cost of Module Development by Element in Actual Dollars, 1972-73. . 45

Cost of Module Development by Element in Actual Dollars, 1973-74. . 46

Cost of Module Development by Element in Actual Dollars, 1974-75. . 47

Total Cost of Module Development by Year in Actual Dollars. 53

Summary of Module Development by Element in Actual Dollars. 55

Summary of Module Development by Year in Constant 1968-69 Dollars 56

Cost of Conditional Sale and Security Agreement 59

Cost of Installation and Related Cost of the Computer Component. . 61

Data-Processing Personnel Needs During Development Phase 64

Estimated Yearly Salary of Data-Processing Personnel 65

Estimated Cost of Computer Component Developmental and Operational 66

Number of Media Items to Be Developed Locally 68

Estimates of Faculty Time Requirements for Media Production 70

Summary of Special Requirements for Visual Materials 71

Estimated Average Annual Cost of Media Production Personnel 72

Estimates of Studio Time Requirements for Video Tape and Film Production. 73

Studio-Related Annual Expenses. 74

Number of Commerically Developed Media Items to Be Purchased. . . . 75

Estimated Cost of Commercially Produced Media for Five Years of Development 76

Estimated Cost for Capital Equipment Related to Media 78

Cost of Media in Actual Dollars -- Annually and for Development and Operation 79

Total Cost of Media Component During Development Period 79

Cost of Tele-Communications Equipment 80

Total Cost of Media Plus Tele-Communications During Development Period 80

Development of Faculty In-Service in Actual Dollars 82

Future-Planning Unit Development Costs in Actual Dollars. 83

Management System Development in Actual Dollars 84

Research Center Development Cost in Actual Dollars 85

Summary of All Development Costs in Actual Dollars 86

Summary of All Costs for Development Phase in Constant 1968-69 Dollars 87

Implementation of the WETEP Operational Program During the Development Period 92

Cost of Five Years of WETEP Instructional Program Operation 93

Cost of WETEP Fully Implemented for 1975-76 94

Cost of WETEP Summer Session 1976 95

Cost of WETEP Support Systems (1975-76) 96

Costs Associated with Element Operation 97

Cost of Computer Operation in 1975-76 98

Cost of Media Operation in 1975-76 98

Reduced Time in WETEP Content Areas 118

Comparative Annual Operating Costs for the Current Elementary Teacher Education Program and WETEP. 134

WETEP Support Activties 136

WETEP Development Costs 137

Per Student Development Costs 139

Comparison of WETEP Benefits and Costs. 141

Cost of Approximating WETEP Within the Present Program Format . . . 147

LIST OF FIGURES

WETEP Components and Elements 117

Incremental Annual Value of WETEP Graduates Required for Economic Feasibility. 150

PART I

PRICING

Development and implementation of the WETEP instructional program will require the distribution of resources in patterns which differ substantially from those which support present practices in higher education. Part I of this volume presents a complete pricing of WETEP within a Planning, Programming, Budgeting System. The cost analysis presented here provides estimates of the amounts of financial support which will be needed to develop and implement WETEP and furnishes the empirical basis for the economic analysis of WETEP.

The first paper in this section prices and projects the costs of the present teacher education program on the University of Wisconsin campus. The pricing of the present program was included in the cost analysis to permit meaningful comparisons between current costs and expected WETEP costs.

The second paper prices all phases of development activity. These include the development of the instructional modules, the assessment support system, the computer component, the instructional media, the faculty in-service programs, the future-planning center, the management system, and the research center.

The final paper in this section presents the expected costs of all phases of WETEP operation. Instructional program and support activities are priced within a PPB framework consistent with WETEP goals and structural organization. The paper includes a brief discussion of transferability of WETEP to additional colleges and universities.

INTRODUCTION TO PRICING

LeRoy J. Peterson

2/3

A major task in the feasibility analysis of WETEP is a complete cost analysis of the proposed program. The proposed program requires not only extensive resources for development and operation but also the distribution of resources to activities which differ substantially from those characteristic of present practices in higher education. Therefore a detailed pricing of all proposed activities is required. The cost analysis presented here serves two major functions. First, it provides estimates of the amounts of financial support which will be needed to develop and implement WETEP. Second, it furnishes the empirical basis for the economic analysis of WETEP.[1]

As a first step in the cost analysis, operating costs of both the present elementary teacher education program and WETEP were calculated. The pricing of the present program was included to permit meaningful comparisons between current costs and expected WETEP costs. The estimates of operating costs included not only current costs but probable future costs of the present program. This is essential if the costs of a fully developed WETEP in 1975-76 are to be compared with the projected costs of the present program for the same year. The cost of the present program obviously must reflect the year-to-year improvements and increasing cost of the present program which can be assumed to continue.

In a program designed for the future, the cost of development is a major influence in decision making. All phases of development and operational activity have been included in this pricing. These activities include the development of modules, the assessment support system, the computer component, the instructional media, the faculty-in-service programs, the future-planning unit, the management system, and the research center.

These activities are priced not only as major areas of development but also as segments of WETEP operation. The computer component and media, because of their unique contributions to WETEP, are illustratively priced in considerable detail.

WETEP is committed to allocating its resources within the framework of a Planning-Programming-Budgeting (PPB) System. The appropriateness of a PPB system as the basis for presenting cost estimates within WETEP can be illustrated by a brief review of

---

[1] Mary A. Golladay, "An Economic Analysis of the Wisconsin Elementary Teacher Education Project," WETEP, Vol. VI, Feasibility Study: Pricing and Economic Analysis.

WETEP characteristics which conform to the major PPB concepts. These concepts include:

1) Organizing activities with similar objectives into program categories.
2) Identifying ultimate output objectives for each program.
3) Devising alternative policies for achieving program objectives.
4) Preparing a cost-benefit analysis for each alternative.
5) Projecting policy proposals several years into the future.

Each concept reflects an important characteristic of WETEP goals and structure, as a brief examination reveals. First, PPB requires that activities which have similar objectives be grouped together for budgetary purposes. The design for WETEP administration is consonant with this principle. While seven separate budgetary units within the School of Education presently contribute to the education of an elementary school teacher, WETEP will consolidate these efforts into one main budgetary unit. In addition, the activities within WETEP are grouped according to programs. For example, all activities dealing with the preparation of the elementary teacher in the areas of reading, writing, speaking, etc. are grouped within the Communications Element.

Second, PPB requires the specification of objectives for program categories. These objectives are stated in terms of ultimate outputs, not as preliminary steps to a final goal. The objectives of WETEP are concerned not only with the number and quality of graduates from the program but also with output in the form of studies aimed at improving and measuring teacher effectiveness and teacher retention. Continuing research throughout WETEP will lead to refinements in spcification of ultimate outcomes of WETEP.

Third, alternative routes to the accomplishment of the specified objectives must be developed in PPB procedures. Alternatives exist within WETEP in many aspects of the program, including the choice of instructional plans, learning sequences and instructional modes. An analysis of the effectiveness of each module will provide for the refinement of activities within modules and elements.

Fourth, a cost-benefit analysis of each alternative must involve both the determination of total costs for alternatives and the identification of benefits resulting from the adoption of each alternative. Cost analyses and benefit identification have been dominant activities throughout Phase II of WETEP. Major attention has been given to the determination of the total cost of WETEP and selected alternatives. Simultaneously an analysis of benefits provided by instructional modes, program elements and the total WETEP program has been conducted.

Finally, long-range planning is a major objective of a PPB system. The emphasis on long-range planning in WETEP is evident throughout the published WETEP volumes.

The cost analysis of WETEP is presented in three papers. Costs of the present elementary teacher education program on the campus of the University of Wisconsin are presented in the first paper in order to provide a basis for comparison with the cost estimates of WETEP operation. The second paper prices WETEP development activities, within the categories of module, media, computer and support systems development. The third paper presents the expected costs of all phases of WETEP operation with a brief discussion of transferability of WETEP to additional colleges and universities.

PRICING THE PRESENT PROGRAM

LeRoy J. Peterson
Thomas J. Flygare

8/9

Introduction

In pricing the present University of Wisconsin Elementary Teacher Education Program, the academic year 1967-68 was selected since it was the last year for which cost data were available when the analysis was started. Thus, 1967-68 became the base year for projection of all future costs for the present program. Available cost data were subject to a number of limitations which will be pointed out in the presentation of present and projected costs.

In identifying present costs an effort was made to ascertain all costs of the University of Wisconsin, School of Education which were legitimately chargeable to the preparation of and service to elementary teachers. Viewed from this perspective, some of the cost of operation of the office of the Dean of the School of Education, the Instructional Materials Center, and the Teacher Placement Bureau were appropriately included, although, in strict interpretation, they are not instructional costs.

The Present Elementary Teacher Education Program: A Cost Analysis

Any analysis of costs requires some understanding of the program and the anticipated activities of the students. This information is provided here for the elementary education program at the University of Wisconsin, Madison. The description is as concise as possible, consonant with a clear understanding of the program for which costs are determined.

The present elementary education program generally requires 41 credits of professional education courses. In addition, the student usually takes three elective credits within the School of Education for a total of 44 credits in education. Of these 44 credits, 32 are required in the Department of Curriculum and Instruction, six are required in the Department of Educational Psychology and three in the Department of Educational Policy Studies. The three elective credits are generally taken in a specialized area within the Department of Curriculum and Instruction.

Auxiliary services are provided for the student by the Student Personnel Office, the Instructional Materials Center, the Teacher Placement Bureau, and the Office of the Dean. The student is required to confer with one of the counselors of the Student Personnel Office as part of the application procedure. He also is expected to do extensive work in the Instructional Materials Center as part of several courses in his program. If he desires occupational placement following graduation from the university, he registers at the Teacher Placement Bureau where his credentials are kept on file during his teaching career. Responsibility for administering the entire School of Education is a function of the Office of the Dean of the School of

Education. The costs of all of the above services are appropriately included in costing the elementary education program.

To arrive at total costs, both direct and indirect, including instructional costs and the cost of auxiliary services, three steps were necessary:

1. Identify those items of costs which were chargeable to the elementary education program in total.
2. Identify costs which were divided between the elementary education program and other programs or divisions of the School of Education or the university.
3. Establish criteria and procedures for dividing costs between the elementary education program and other programs or divisions.

Decisions Required to Begin Cost Analysis

Since the latest year for which adequate data were available was the 1967-68 academic year, that year was selected for analysis. The choices were reduced to the costing of a student's program for that academic year (he normally takes his professional education credits over a two year period), or the costing of the entire 44 credit program. Because the emphasis in WETEP is upon the entire elementary education program, the decision was made to determine costs based on 44 education credits plus the cost of the auxiliary services for one year. The total was then calculated for the 1967-68 academic year. For the purpose of this analysis it was assumed that all 44 education credits of all students, including the transfer students, had been earned at the University of Wisconsin, Madison.

A crucial decision was required regarding the cost of instruction while the student was off-campus for his student teaching experience. During this time the student is registered for ten credits at the university, but generally has contact only with graduate student teaching supervisors who periodically observe the student teacher in actual classroom situations. In this analysis it was decided to include no direct campus instructional costs for the period of the student's off-campus teaching. Thus, only the salaries of the supervisors plus the expenses of the Office of Clinical Experiences for Teachers were used in calculating the cost of the student teaching experience. The credits earned in student teaching were subtracted from the total student-credits in the Department of Curriculum and Instruction to compute the average cost of the remaining credits in the department. The procedure is explained in detail later in the report.

Major Limitations of the Cost Analysis

The task of determining the cost of educating a university student is extremely complex. The results are acceptable only when accompanied by an understanding of the limitations inherent in available data, and the procedures necessitated by those limitations. It is to be understood that the cost analysis in the present study is limited to those costs incurred by the School of Education in preparing elementary school teachers. Myriad costs exist outside the School of Education which are not accounted for in this approach. For example, the typical student earns 84 of the 128 credits required for graduation outside the School of Education. In addition, costs are incurred in his use of the Memorial Library and the Memorial Union, and in countless other campus activities, all of which contribute to the education of a teacher. However, since they are not School of Education costs, they fall outside the framework of the current study.

Another significant limitation is evident in the procedures used to determine costs. Since each cost could not be individually determined, it was necessary to resort to the use of average costs throughout the study. As an illustration, the average cost of each credit at the junior-senior level in Curriculum and Instruction was $57.45. Obviously, cost differentials exist among the 6,227 student-credits earned at that level within the department in 1967-68. (Note: Student-credits are the result of multiplying the number of students in a course by the number of credits designated to the course. For example, if 100 students complete a three credit course, 300 student-credits would be earned.)

A variety of factors enter into the cost of each credit: the number of students per class, the size of the classroom, the professor's salary and other factors. Data and time constraints in this study made impossible the summation of the cost impact of each of these variables, or the identification of individual credit costs. Without a detailed analysis of the time allocations of each professor, secretary, and teaching assistant, and supportive services and facilities devoted to each class (or preferably to each student in each class), the calculation of a refined result was not feasible. It was possible, however, to modify average costs to some extent. The modifications were reflected in recognition of cost differentials of graduate and undergraduate education and in the determination of the costs of student teaching experiences.

Cost of Present Program

Disbursements for the present elementary education program are presented in two formats. The first is the categorization of expenditures according to the cost of traditional course offerings and services. The second format reclassifies traditional courses into

WETEP categories. The first analysis shows the per student cost for student personnel services, course offerings, administration of the Dean's office, the Instructional Materials Center and the Teacher-Placement Bureau. These costs are categorized under appropriate classifications which include:

1. Departmental Instruction
2. Clinical Experiences
3. Supervision of Student Teaching
4. Multi-Media Laboratory
5. Other Supportive Services
6. Operation and Maintenance
    a. Departmental
    b. Multi-Media Laboratory
    c. Office of Clinical Experiences
    d. Supportive Services
7. Depreciation or Lease
    a. Departmental
    b. Multi-Media Laboratory
    c. Office of Clinical Experiences
    d. Supportive Services

A summary of the per student cost for each category in 1967-68 is presented in Table I. The total per student expenditure and the per cent of the expenditure devoted to each function is also shown.

Data in Table I indicate that the cost of providing instruction and other services in the preparation of one elementary teacher, including the 44 credits and clinical experiences, was $2,869.68 in 1967-68. Most of this cost, 59.5 per cent, was the cost of departmental instruction. The next largest cost was clinical experiences, accounting for 14.7 per cent of the total. All instructional costs combined accounted for 83.5 per cent of the total, with the balance divided between cost of operations and maintenance, and depreciation and lease.

Reclassification to WETEP Elements

The cost figures in Table I are significant indicators of the cost of the present program within commonly accepted categories. However, except for totals, they are relatively meaningless as a basis for comparison with the cost of WETEP. Thus, it was necessary to recategorize the accounts and expenditures into a format of direct comparability with WETEP. This was done by substituting the classification structure of WETEP and presenting the present cost of pertinent items.

The reclassification of the present elementary education courses into WETEP categories presented no real problem except with the courses Curriculum and Instruction 111, 112, and 113. Curriculum

TABLE I

COST WITHIN THE UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION FOR THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE*
(PRESENT PROGRAM, 1967-68)

Services & Course Offerings			Instructional Costs				Operations & Maintenance				Depreciation & Lease					
			Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Total
1. Student Personnel Services							58.08									58.08
Dept.	Course	Credits														
2. C & I	104	3	172.35		7.35			5.38	.71			10.00	.20			195.90
3. C & I	111	5	287.25	78.14		140.18		13.45		2.63		25.00		.73		547.38
4. C & I	112	5	287.25	78.14		140.18		13.45		2.63		25.00		.73		547.38
5. C & I	113	6	344.70					16.14				30.00				390.84
6. C & I	212	10		78.14		140.18				2.63				.73		221.68
7. C & I	340	3	172.35		25.53				2.50				.70			201.08
8. C & I	elect.	3	172.35					8.07				15.00				195.42
9. Ed. Pol.		3	116.25					4.56				3.72				124.53
10. Ed. Psych	100 or 305	3	76.71					3.78				4.56				85.05
11. Ed. Psych	340	3	76.71					3.78				4.56				85.05
12. Dean's Office							122.76				7.70				3.52	133.98
13. Instructional Materials Center							32.28				6.34				1.61	40.23
14. Teacher Placement Bureau							37.51				.88				4.60	42.99
Total			1,705.92	234.42	32.88	420.54	250.63	68.61	3.21	7.89	14.92	117.84	.90	2.19	9.73	2,869.68
Per Cent of Total			59.5	8.2	1.1	14.7	8.7	2.4	0.1	0.3	0.5	4.1	0.0	0.1	0.3	100.0

*Cost of Providing 44 Credits Plus Clinical and Other Experiences and Instruction 111 and 112 comprise a continuous two-semester sequence containing five equal parts: the teaching of reading, language arts, mathematics, social studies, and science. The student earns ten credits in the two-semester sequence; therefore, each of the five sections is valued at two credits. However, the Communications Element of WETEP includes both the reading and language arts sections comprising the equivalent of a four credit block in the transfer to WETEP classification. The Communications Element also includes the equivalent of one credit from Curriculum and Instruction 113 which will be discussed below.

Along with the academic portions of this course, the student is required to spend two half-days a week in "observation-participation" in local elementary classrooms. This practicum incurs administration costs from the Office of Clinical Experiences for Teachers, which places students in elementary schools as well as coordinates the supervision of the practicum experience, and costs for the salaries of the supervisors, who observe and evaluate the student's behavior during the practicum. Costs are also incurred by the schools in which the students carry out their practicum and clinical experiences, but the identification of those costs falls outside the framework of this study. Since an effort is made to coordinate these practicum activities with the classroom instruction of Curriculum and Instruction 111 and 112, the costs incurred in the practicum were allocated to the subject matter categories of WETEP rather than to the clinical experience category.

Curriculum and Instruction 113 presented simpler problems of reclassification because supervisors' salaries and the Office of Clinical Experiences for Teachers' costs were not involved. This six credit course has five parts: the equivalent of one credit each of art, music, physical education, and speech, and the equivalent of two credits in preparation for the student teaching experience. In the reclassification to WETEP categories, speech came within the Communications Element while the other four parts had their own WETEP equivalent. The cost of the six credit course was then allocated in the following manner: one-sixth each to Art Education, Music Education, Physical Education, and Communications(which also was allocated the equivalent of four credits from Curriculum and Instruction 111 and 112), and two-sixth to Preparation for Student Teaching.

Table II contains the costs of the present elementary teacher education program in WETEP categories. Notes explaining the costing procedures in more detail appear in Appendix I.

In the review of Table II, it will be noted that in the present program there is no equivalent for a number of elements which are an integral part of the WETEP program. Thus there are no cost figures for these elements. To the extent that the basic categories can be

TABLE II

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE
(PRESENT PROGRAM IN WETEP CATEGORIES, 1967-68)

Elements	Instructional Cost					Operations & Maintenance				Depreciation & Lease				
	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Total
I. Input														
A. Screening														
B. Advising					58.08									58.08
C. Orientation	172.35		7.35			5.38	.71			10.00	.20			195.99
II. Teaching-Learning														
A. Communications[1]	287.25	62.51		112.15		13.45		2.10		25.00		.58		503.04
B. Mathematics Education[2]	114.90	31.26		56.07		5.38		1.05		10.00		.29		218.95
C. Science Education[3]	114.90	31.26		56.07		5.38		1.05		10.00		.29		218.95
D. Social Studies Education[4]	114.90	31.26		56.07		5.38		1.05		10.00		.29		218.95
E. Safety Education[5]														
F. Health Education[6]	172.35		25.53				2.50				.70			201.08
G. Leisure Education														
H. Art Education[7]	57.45					2.69				5.00				65.14
I. Music Education[8]	57.45					2.69				5.00				65.14
J. Physical Education[9]	57.45					2.69				5.00				65.14
K. Guidance Education														
L. Media and Technology														
M. Educational Psychology[10]	153.42					7.56				9.12				170.10
N. Educational Policy Studies[11]	116.25					4.56				3.72				124.53
O. Curriculum and Instruction [12]	172.35					8.07				15.00				195.42
P. Early Childhood														
Q. Culturally Diverse														
R. Special Education														
III. Output														
A. Preparation for Student-Teaching [13]	114.90					5.38				10.00				130.28
B. Clinical Experience [14]		78.14		140.18				2.63				.73		221.68
IV. Placement and In-service [15]					37.51				.88				4.60	42.99
V. Dean's Office [16]					122.76				7.70				3.52	133.98
VI. Instructional Materials Center [17]					32.28				6.34				1.61	40.23
Total [18]	1,705.92	234.43	32.88	420.54	250.63	68.61	3.21	7.88	14.92	117.84	.90	2.18	9.73	2,869.67
Per cent of Total	59.5	8.2	1.1	14.7	8.7	2.4	.1	.3	.5	4.1	.0	.1	.3	100.0

Footnotes can be found in Appendix

made comparable, a direct marginal cost comparison of the two programs is possible; with some estimation of cost figures, this comparability has been achieved. The following two program areas will illustrate the procedures used in this study.

Educational Counseling Services

While faculty members at the University of Wisconsin are responsible for counseling students, no rational basis has appeared for determination of the amount of faculty time devoted to this activity. Thus, no part of professorial salary has been allocated to counseling, which obviously understates the cost of counseling and overstates the cost of departmental instruction. However, some of the cost of counseling can be identified, and costs can be allocated to this function.

The Educational Counseling Service, under direction of the Assistant Dean of the School of Education, is responsible for counseling all students in the School of Education. Thus, it is appropriate to charge a portion of the budget of the Counseling Service to the program for preparation of elementary teachers.

In 1967-68, the Educational Counseling Service operated on a budget of $71,252 for salaries and wages. Dividing this by the total number of student-credits taken in the School of Education, which for the same period was 53,794, results in a per credit amount of $1.32. The cost for counseling service for an elementary education major taking 44 credits in the School of Education would be $58.08. This is the amount which is allocated for counseling in 1967-68.

The operations and maintenance costs and the depreciation and lease costs for counseling are included under the costs of the Dean's Office. Data did not permit allocation of these expenditures separately for the function of counseling.

Orientation

Orientation to elementary education is presently accomplished through a three credit course, Curriculum and Instruction 104, Introduction to Elementary Education. To arrive at the cost of this function, it was necessary to calculate instructional costs for all courses in Curriculum and Instruction. Three factors were recognized in these calculations: 1) total departmental budget (salaries, supplies, and capital equipment) exclusive of salaries paid to the supervisors of student teaching; 2) the total number of student credits earned at each level exclusive of the credits earned in student teaching; and 3) the relative weights attached to credits at each level within the School of Education by the Institutional Studies Agency of the University of Wisconsin, to reflect different instructional costs within the university for students at different levels. These relative weights are:

Level I (Freshmen and Sophomores) = 1.00812
Level II (Juniors and Seniors) = 1.00000
Level III (Graduate Students) = 1.84742
Special Students = 1.00000

By weighting credits accordingly, the cost per student credit of each level within the Department of Curriculum and Instruction was calculated to be:

Level I: $57.94
Level II: $57.45
Level III: $106.45
Special Students: $57.45

Thus, instructional cost of the three-credit course at Level II utilized to orient elementary education students is $172.35 per student. To this cost must be added the cost of the use of the multi-media laboratory, since this course is generally organized so that all sections meet together once a week in that facility. The laboratory operated 33 hours a week on a budget of $58,700 for the academic year 1967-68. The total budget was divided by 33 to determine the cost for the use of the lab for one hour each week for an academic year. This cost was then divided by the number of students who took the course (242) to arrive at the total cost of $7.35 per student per year.

Operations and maintenance costs to be added for university-owned facilities include:

1. Salaries and wages for janitorial service, security and protection, safety, motor vehicle operations, shops, and the physical plant director's office

2. Supplies and expenses for these activities

3. Utilities: heat, electricity, sewer, and water

4. Equipment

5. Building repairs

The total for these disbursements amounted to $1.441 per square foot of university-owned space in 1967-68. For space leased by the university, the owner generally provides the janitorial service, supplies, and equipment, and repairs on the building, reducing the operations and maintenance cost to the university to $.657 per square foot. (This is over and above the cost of the space leased to the university).

The total cost of operations and maintenance for the Department of Curriculum and Instruction was calculated by multiplying $.657 by 14,476.739 (see data in Appendix II), the total space leased by the

Department in 1967-68, and by multiplying $1.441 by 12,956.477 square feet, the total university-owned space used by the Department. The sum of the two calculations was $28,181.50. This sum divided by 10,460, the total number of credits exclusive of student teaching credits earned in the Department, resulted in an operations and maintenance cost per student-credit of $2.69. Since the orientation course met only twice a week in space allocated to the Department of Curriculum and Instruction (the third hour being in the Multi-media Laboratory), the department operations and maintenance cost was arrived at by multiplying 2, the number of hours the course meets in department space, by $2.69, the per credit cost, for a total of $5.38.

Operations and maintenance cost must also be calculated for the use of the multi-media laboratory. The facility's 3,989.190 square feet are all in university-owned buildings incurring a per square foot operations and maintenance cost of $174.20, which, divided by the number of students in the course for that hour, 242, results in a per student operations and maintenance cost of $.71 for use of the Multi-media Laboratory.

In addition to the cost of operations and maintenance, depreciation and lease costs must be added to determine the full cost of conducting any activity carried on in buildings. In making this calculation, the depreciation and lease costs were calculated as follows. The replacement value of the building was divided by 50 to determine the annual depreciation. Then for each building used by the Curriculum and Instruction Department, the percentage of the total square footage actually used by Curriculum and Instruction was calculated. For example, 11.6 per cent of the assigned and unassigned space of the Education Building was used by Curriculum and Instruction. The annual depreciation of the building was then multiplied by the percentage of use by the Department. The 1968 Financial Report of the University of Wisconsin lists the replacement value of the Education Building at $1,407,398 which divided by 50 yielded an annual depreciation value of $28,147.96, with Curriculum and Instruction charged with 11.6 per cent of the total.

This procedure was followed for each of the six buildings used by Curriculum and Instruction during the 1967-68 academic year. The total depreciation attributable to Curriculum and Instruction was divided by the number of student-credits accumulated in Curriculum and Instruction to yield a depreciation cost per credit. If the building was leased by the university, the annual lease cost was used in lieu of the annual depreciation. The total annual depreciation and lease costs of $52,329.39 (see data in Appendix II, Table B) divided by the 10,460 student-credits resulted in a per student per credit cost of $5.00. Since the orientation course meets twice a week in department space, the depreciation and lease cost is 2 multiplied by $5.00 for a total of $10.00.

Since the remaining hour each week is held in the Multi-media Laboratory, the total annual depreciation of the laboratory (see Appendix II, Table G) of $1,604.43 was divided by 33 to determine the depreciation of the lab when used for one hour each week for an academic year. This figure, $48.62, divided by 242, the number of students in the orientation course, resulted in a per student per year depreciation cost for this course of $.20.

The procedures described above should provide a basis for understanding the manner in which costs for the present program were determined in two areas. For a description of the procedures used for the balance of the program, see Appendix I.

Projection of Present Program Costs

To provide a meaningful comparison with the anticipated cost of WETEP within a marginal cost framework, it was necessary to project the costs incurred in the 1967-68 academic year through 1975-76. These projections for each year to 1975-76 are shown on Table III-A through Table III-H. These projections were made using an annual growth rate of 6.26 per cent, which is the average annual increase shown by the Cost of Education Index* since 1961-62. The index represents increased costs due to both improvement in services and inflation. The projections based on the Index show what the costs will be each year if price increases in the future, including increases due to inflation, are comparable to price increases since 1961-62. This growth rate was applied to all 1967-68 costs, except those due to depreciation, and carried out through the 1975-76 academic year. Columns 10, 11, 12 and 13 on all tables show a combination of depreciation and lease costs. In these cases, the annual growth rate was applied to only that portion of the department space which was leased; the depreciation costs for university-owned facilities remained constant from year to year.

A special problem arose in the projection of costs for 1972-73 when the new Teacher Education Building is expected to be ready for occupancy. Since this building will hold the entire Curriculum and Instruction Department and the Instructional Materials Center, the depreciation and lease costs for programs in these two areas were moved within a university-owned building depreciation framework explained below.

Educational Psychology is also expected to be housed in a new building at that time, and average square footage costs for the Teacher Education Building were applied for that instructional space.

---

*Explanation of this index will be given in the pricing of WETEP.

TABLE III - A

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE
(PRESENT PROGRAM IN WETEP CATEGORIES, 1968-69)

Elements	Instructional Cost					Operations & Maintenance				Depreciation & Lease				
	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Total
I. Input														
A.Screening														
B.Advising					61.72									61.72
C.Orientation	183.14		7.81			5.72	.75			10.34	.20			207.96
II. Teaching-Learning														
A.Communications	305.23	66.42		119.17		14.29		2.23		25.85		.58		533.77
B.Mathematics Education	122.09	33.22		59.58		5.72		1.12		10.34		.29		232.36
C.Science Education	122.09	33.22		59.58		5.72		1.12		10.34		.29		232.36
D.Social Studies Education	122.09	33.22		59.58		5.72		1.12		10.34		.29		232.36
E.Safety Education														
F.Health Education	183.14		27.13				2.66				.70			213.63
G.Leisure Education														
H.Art Education	61.05					2.86				5.17				69.08
I.Music Education	61.05					2.86				5.17				69.08
J.Physical Education	61.05					2.86				5.17				69.08
K.Guidance Education														
L.Media and Technology														
M.Educational Psychology	163.02					8.03				9.38				180.43
N.Educational Policy Studies	123.53					4.85				3.79				132.17
O.Curriculum and Instruction	183.14					8.58				15.51				207.23
P.Early Childhood														
Q.Culturally Diverse														
R.Special Education														
III. Output														
A.Preparation for Student-Teaching	122.09					5.72				10.34				138.15
B.Clinical Experience				148.96				2.79				.73		152.48
IV. Placement and In-service					39.86				.94				4.89	45.69
V. Dean's Office					130.44				8.18				3.53	142.15
VI. Instructional Materials Center					34.30				6.74				1.61	42.65
Total	1,812.71	166.08	34.94	446.87	266.32	72.93	3.41	8.38	15.86	121.74	.90	2.18	10.03	2,962.35
Per cent of Total	61.2	5.6	1.2	15.1	9.0	2.5	.1	.3	.5	4.1	.03	.1	.3	100.0

TABLE III-B

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE
(PRESENT PROGRAM IN WETEP CATEGORIES, 1969-70)

Elements	Instructional Cost					Operations & Maintenance				Depreciation & Lease				
	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Total
I. Input														
A. Screening														
B. Advising					65.58									65.58
C. Orientation	194.60		8.30			6.07	.80			10.68	.20			220.65
II. Teaching-Learning														
A. Communications	324.33	70.58		126.63		15.19		2.37		26.70		.58		566.38
B. Mathematics Education	129.73	35.30		63.31		6.07		1.19		10.68		.29		246.57
C. Science Education	129.73	35.30		63.31		6.07		1.19		10.68		.29		246.57
D. Social Studies Education	129.73	35.30		63.31		6.07		1.19		10.68		.29		246.57
E. Safety Education														
F. Health Education	194.60		28.83				2.82				.70			226.95
G. Leisure Education														
H. Art Education	64.87					3.04				5.34				73.25
I. Music Education	64.87					3.04				5.34				73.25
J. Physical Education	64.87					3.04				5.34				73.25
K. Guidance Education														
L. Media and Technology														
M. Educational Psychology	173.23					8.54				9.65				191.42
N. Educational Policy Studies	131.26					5.15				3.86				140.27
O. Curriculum and Instruction	194.60					9.11				16.02				219.73
P. Early Childhood														
Q. Culturally Diverse														
R. Special Education														
III. Output														
A. Preparation for Student-Teaching	129.73					6.07				10.68				146.48
B. Clinical Experience		88.23		158.28				2.97				.73		250.21
IV. Placement and In-service					42.35				.99				5.20	48.54
V. Dean's Office					138.61				8.69				3.54	150.84
VI. Instructional Materials Center					36.45				7.16				1.61	45.22
Total	1,926.15	264.71	37.13	474.84	282.99	77.46	3.62	8.91	16.84	125.65	.90	2.18	10.35	3,231.73
Per Cent of Total	59.6	8.2	1.1	14.7	8.8	2.4	.1	.3	.5	3.9	.02	.1	.3	100.0

TABLE III - C

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE (PRESENT PROGRAM IN WETEP CATEGORIES, 1970-71)

	Instructional Costs					Operations & Maintenance				Depreciation & Lease				
Elements	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Total
I. Input														
A. Screening														
B. Advising					69.68									69.68
C. Orientation	206.79		8.82			6.45	.85			11.04	.20			234.15
II. Teaching-Learning														
A. Communications	344.64	75.00		134.56		16.14		2.52		27.60		.58		601.04
B. Mathamatics Education	137.86	37.51		67.27		6.45		1.26		11.04		.29		261.68
C. Science Education	137.86	37.51		67.27		6.45		1.26		11.04		.29		261.68
D. Social Studies Education	137.86	37.51		67.27		6.45		1.26		11.04		.29		261.68
E. Safety Education														
F. Health Education	206.79		30.63				3.00				.70			241.12
G. Leisure Education														
H. Art Education	68.93					3.23				5.52				77.68
I. Music Education	68.93					3.23				5.52				77.68
J. Physical Education	68.93					3.23				5.52				77.68
K. Guidance Education														
L. Media and Technology														
M. Educational Psychology	184.07					9.07				9.93				203.07
N. Educational Policy Studies	139.48					5.47				3.93				148.88
O. Curriculum and Instruction	206.79					9.68				16.56				233.03
P. Early Childhood														
Q. Culturally Diverse														
R. Special Education														
III. Output														
A. Preparation for Student-Teaching	137.86					6.45				11.04				155.35
B. Clinical Experience		93.75		168.19				3.16				.73		265.83
IV. Placement and In-service					45.00				1.06				5.53	51.59
V. Dean's Office					147.29				9.24				3.55	160.08
VI. Instructional Materials Center					38.73				7.61				1.61	47.95
Total	2,046.79	281.28	39.45	504.56	300.70	82.30	3.85	9.46	17.91	129.78	.90	2.18	10.69	3,429.85
Per Cent of Total	59.7	8.2	1.1	14.7	8.8	2.4	1.	.3	.5	3.8	.02	.1	.3	100.0

POOR ORIGINAL COPY - BEST AVAILABLE AT TIME FILMED

TABLE III - D

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE
(PRESENT PROGRAM IN WETEP CATEGORIES, 1971-72)

Elements	Instructional Cost					Operation & Maintenance				Depreciation & Lease				
	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Total
I. Input														
A. Screening														
B. Advising					74.05									74.05
C. Orientation	219.73		9.37			6.86	.91			11.40	.20			248.47
II. Teaching-Learning														
A. Communications	366.22	79.69		142.98		17.15		2.68		28.50		.58		637.80
B. Mathematics Education	146.49	39.85		71.48		6.86		1.34		11.40		.29		277.71
C. Science Education	146.49	39.85		71.48		6.86		1.34		11.40		.29		277.71
D. Social Studies Education	146.49	39.85		71.48		6.86		1.34		11.40		.29		277.71
E. Safety Education														
F. Health Education	219.73		32.55				3.19				.70			256.17
G. Leisure Education														
H. Art Education	73.24					3.43				5.70				82.37
I. Music Education	73.24					3.43				5.70				82.37
J. Physical Education	73.24					3.43				5.70				82.37
K. Guidance Education														
L. Media and Technology														
M. Educational Psychology	195.60					9.64				10.22				215.46
N. Educational Policy Studies	148.21					5.81				4.00				158.02
O. Curriculum and Instruction	219.73					10.29				17.10				247.12
P. Early Childhood														
Q. Culturally Diverse														
R. Special Education														
III. Output														
A. Preparation for Student-Teaching	146.49					6.86				11.40				164.75
B. Clinical Experience		99.62		178.72				3.35				.73		282.42
IV. Placement and In-service					47.82				1.12				5.88	54.82
V. Dean's Office					156.51				9.82				3.56	169.89
VI. Instructional Materials Center					41.15				8.09				1.61	50.85
Total	2,174.90	298.86	41.92	536.14	319.53	87.48	4.10	10.05	19.03	133.92	.90	2.18	11.05	3,640.06
Per Cent of Total	59.7	8.2	1.2	14.7	8.8	2.4	.1	.3	.5	3.7	.02	.1	.3	100.0

TABLE III - E

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE
(PRESENT PROGRAM IN WETEP CATEGORIES, 1972-73)

Elements	Instructional Cost					Operation & Maintenance				Depreciation & Lease				
	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Total
I. Input														
A. Screening														
B. Advising					78.68									78.68
C. Orientation	233.48		9.96			10.93				29.43				283.80
II. Teaching-Learning														
A. Communications	389.14	84.68		151.93		18.22		2.84		49.05		.58		696.44
B. Mathamatics Education	155.66	42.35		75.96		7.29		1.42		19.62		.29		302.59
C. Science Education	155.66	42.35		75.96		7.29		1.42		19.62		.29		302.59
D. Social Studies Education	155.66	42.35		75.96		7.29		1.42		19.62		.29		302.59
E. Safety Education														
F. Health Education	233.48		34.59			10.93				29.43				308.43
G. Leisure Education														
H. Art Education	77.83					3.64				9.81				91.28
I. Music Education	77.83					3.64				9.81				91.28
J. Physical Education	77.83					3.64				9.81				91.28
K. Guidance Education														
L. Media and Technology														
M. Educational Psychology	207.84					10.24				27.18				245.26
N. Educational Policy Studies	157.48					6.18				4.07				167.73
O. Curriculum and Instruction	233.48					10.93				29.43				273.84
P. Early Childhood														
Q. Culturally Diverse														
R. Special Education														
III. Output														
A. Preparation for Student-Teaching	155.66					7.29				19.62				182.57
B. Clinical Experience		105.86		189.90				3.56				.73		300.05
IV. Placement and In-service					50.81				1.19				6.25	58.25
V. Dean's Office					166.30				10.43				3.57	180.30
VI. Instructional Material Center					43.73				8.59				133.69	186.01
Total	2,311.01	317.59	44.55	569.71	339.54	107.51		10.66	20.21	276.50		2.18	143.51	4,142.97
Per Cent of Total	55.8	7.7	1.1	13.7	8.2	2.6		.2	.5	6.7		.1	3.5	100.0

TABLE III - F

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE
(PRESENT PROGRAM IN WETEP CATEGORIES, 1973-74)

Elements	Instructional Cost					Operation & Maintenance				Depreciation & Lease				Total
	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	
I. Input														
A. Screening														
B. Advising					83.61									83.61
C. Orientation	248.10		10.58			11.62				29.43				299.73
II. Teaching-Learning														
A. Communications	413.50	89.98		161.44		19.36		3.02		49.05		.58		736.93
B. Mathamatices	165.40	45.00		80.71		7.74		1.51		19.62		.29		320.27
C. Science Education	165.40	45.00		80.71		7.74		1.51		19.62		.29		320.27
D. Social Studies Education	165.40	45.00		80.71		7.74		1.51		19.62		.29		320.27
E. Safety Education														
F. Health Education	248.10		36.75			11.62				29.43				325.90
G. Leisure Education														
H. Art Education	82.70					3.87				9.81				96.38
I. Music Education	82.70					3.87				9.81				96.38
J. Physical Education	82.70					3.87				9.81				96.38
K. Guidance Education														
L. Media and Technology														
M. Educational Psychology	220.85					10.88				27.18				258.91
N. Educational Policy Studies	167.34					6.56				4.14				178.04
O. Curriculum and Instruction	248.10					11.62				29.43				289.15
P. Early Childhood														
Q. Culturally Diverse														
R. Special Education														
III. Output														
A. Preparation for Student-Teaching	165.40					7.74				19.62		.73		193.49
B. Clinical Experience		112.48		201.79				3.79						318.06
IV. Placement and In-service					54.00				1.27				6.64	61.91
V. Dean's Office					176.71				11.08				3.58	191.37
VI. Instructional Materials Center					46.47				9.13				133.69	189.29
Total	2,455.69	337.46	47.33	605.36	360.79	114.23		11.34	21.48	276.57		2.18	143.91	4,376.34
Per Cent of Total	56.1	7.7	1.1	13.8	8.2	2.6		.3	.5	6.3		.04	3.3	100.0

TABLE III - G

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE
(PRESENT PROGRAM IN WETEP CATEGORIES, 1974-75)

Elements	Instructional Cost					Operation & Maintenance				Depreciation & Lease				Total
	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	
I. Input														
A. Screening														
B. Advising					88.84									88.84
C. Orientation	263.63		11.24			12.34				29.43				316.64
II. Teaching-Learning														
A. Communications	439.38	95.62		171.54		20.57		3.21		49.05		.58		779.95
B. Mathematics	175.75	47.82		85.76		8.23		1.61		19.62		.29		339.08
C. Science Education	175.75	47.82		85.76		8.23		1.61		19.62		.29		339.08
D. Social Studies Education	175.75	47.82		85.76		8.23		1.61		19.62		.29		339.08
E. Safety Education														
F. Health Education	263.63		39.05			12.34				29.43				344.45
G. Leisure Education														
H. Art Education	87.88					4.11				9.81				101.80
I. Music Education	87.88					4.11				9.81				101.80
J. Physical Education	87.88					4.11				9.81				101.80
K. Guidance Education														
L. Media and Technology														
M. Educational Psychology	234.67					11.56				27.18				273.41
N. Educational Policy Studies	177.82					6.97				4.21				189.00
O. Curriculum and Instruction	263.63					12.34				29.43				305.40
P. Early Childhood														
Q. Culturally Diverse														
R. Special Education														
III. Output														
A. Preparation for Student-Teaching	175.75					8.23				19.62				203.60
B. Clinical Experience		119.52		214.42				4.02				.73		338.69
IV. Placement and In-service					57.38				1.35				7.06	65.79
V. Dean's Office					187.77				11.78				3.59	203.14
VI. Instructional Materials Center					49.38				9.70				133.69	192.77
Total	2,609.40	358.60	50.29	643.24	383.37	121.37		12.06	22.83	276.64		2.18	144.34	4,624.32
Per Cent of Total	56.4	7.8	1.1	13.9	8.3	2.6		.3	.5	6.0		.04	3.1	100.0

TABLE III - H

COST WITHIN UNIVERSITY OF WISCONSIN SCHOOL OF EDUCATION IN THE PREPARATION OF ONE ELEMENTARY TEACHER CANDIDATE
(PRESENT PROGRAM IN WETEP CATEGORIES, 1975-76)

Elements	Instructional Cost					Operation & Maintenance				Depreciation & Lease				
	Department	Supervision	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Department	Multi-Media Laboratory	Clinical Experiences	Supportive Services	Total
I. Input														
A. Screening														
B. Advising					99.40									99.40
C. Orientation	280.14		11.95			13.12				29.43				334.64
II. Teaching-Learning														
A. Communications	466.90	101.60		182.29		21.86		3.41		49.05		.58		825.69
B. Mathematics	186.76	50.81		91.14		8.74		1.71		19.62		.29		359.07
C. Science Education	186.76	50.81		91.14		8.74		1.71		19.62		.29		359.07
D. Social Studies Education	186.76	50.81		91.14		8.74		1.71		19.62		.29		359.07
E. Safety Education														
F. Health Education	280.14		41.50			13.12				29.43				364.19
G. Leisure Education														
H. Art Education	93.38					4.37				9.81				107.56
I. Music Education	93.38					4.37				9.81				107.56
J. Physical Education	93.38					4.37				9.81				107.56
K. Guidance Education														
L. Media and Technology														
M. Educational Psychology	249.37					12.29				27.18				288.84
N. Educational Policy Studies	188.95					7.41				4.28				200.64
O. Curriculum and Instruction	280.14					13.12				29.43				322.69
P. Early Childhood														
Q. Culturally Diverse														
R. Special Education														
III. Output														
A. Preparation for Student-Teaching	186.76					8.74				19.62				215.12
B. Clinical Experience		127.01		227.85				4.27				.73		359.86
IV. Placement and In-service					60.97				1.43				7.50	69.90
V. Dean's Office					199.53				12.52				3.60	215.65
VI. Instructional Materials Center					52.47				10.31				133.69	196.47
Total	2,772.82	381.04	53.45	683.56	412.37	128.99		12.81	24.26	276.71		2.18	144.79	4,892.98
Per Cent of Total	56.7	7.8	1.1	14.0	8.4	2.6		.3	.5	5.6		.04	3.0	100.0

The method of determining these costs follows. All lease costs for the two departments and the center would be theoretically eliminated in that year, assuming that the entire elementary education program is moved into the new building as plans are now projected. As a result, only depreciation costs will remain which are not subject to the annual growth rate increase. No attempt was made to estimate how many square feet would be devoted to each portion of the present program when it moves to the new building; present space usage figures were simply applied to the depreciation costs of the buildings. For example, if Curriculum and Instruction now uses 2.62 square feet per credit, it was assumed that the same amount of space per credit would be used in the new building. It was determined that the cost plus interest of the new building paid over a 34 year period would result in a depreciation cost of $3.745 per square foot per year. Thus, one credit of Curriculum and Instruction using 2.62 square feet would result in an annual depreciation cost of $9.81 (see Appendix II, Table B).

The Present Program During the Implementation of WETEP

Present plans envision the gradual implementation of WETEP over a five-year period replacing at each stage a portion of the present program. The schedule of implementation follows:

1971-72: 2.0%
1972-73: 22.7%
1973-74: 62.5%
1974-75: 99.2%
1975-76: 100.0%

In each of these years, the present program will provide instruction for the remaining portion of elementary education. For example, in 1972-73, when WETEP provides 22.7 per cent of the instructional program, the present program will still be providing 77.3 per cent. Thus, the cost of the present program will decrease in direct proportion to the degree of WETEP implementation. Table IV and V develop the financial aspects of moving from the present program toward full implementation of WETEP. The difference between column 2 and column 5 on both tables represents the difference between what the present program would cost if it were to continue at full operation through 1975-76 and what the present program will cost as it is replaced by WETEP. Table IV describes the costs in actual dollars, and Table V in constant 1968-69 dollars.

TABLE IV

COST OF PRESENT PROGRAM IN ACTUAL DOLLARS AS WETEP IS IMPLEMENTED

Year	(1) Cost Per Student: Full Operation	(2) Cost for 300 Students: Full Operation	(3) Portion of Present Program Operating	(4) Cost Per Student* (Col. 1 x 3)	(5) Cost for 300 Students (Col. 2 x 3)
1967-68	$2,869	$ 860,901	100.0%	$2,869	$ 860,901
1968-69	2,962	888,705	100.0	2,962	888,705
1969-70	3,231	969,519	100.0	3,231	969,519
1970-71	3,429	1,028,955	100.0	3,429	1,028,955
1971-72	3,640	1,092,018	98.0	3,567	1,070,178
1972-73	4,142	1,242,891	77.3	3,202	960,756
1973-74	4,376	1,312,902	37.5	1,641	492,339
1974-75	4,624	1,387,296	0.8	369	110,985
1975-76	4,892	1,467,894	0.0	0	0
		$10,251,081			$6,382,338

Note: $3,868,743 is the difference in actual dollars between the cost of the present program if it were fully operational through 1975-76 ($10,251,081), and what it will cost as it is gradually replaced by WETEP ($6,382,338).

*Less than whole dollar amounts have been dropped from columns 1 and 4 to facilitate comparison.

TABLE V

COST OF PRESENT PROGRAM IN CONSTANT 1968-69 DOLLARS AS WETEP IS IMPLEMENTED

Year	(1) Cost Per Student: Full Operation	(2) Cost for 300 Students: Full Operation	(3) Portion of Present Program Operating	(4) Cost Per Student* (Col. 1 x 3)	(5) Cost for 300 Students (Col. 2 x 3)
1967-68	$2,890	$ 867,291	100.0%	$2,890	$ 867,291
1968-69	2,962	888,705	100.0	2,962	888,705
1969-70	2,962	888,705	100.0	2,962	888,705
1970-71	2,962	888,705	100.0	2,962	888,705
1971-72	2,962	888,705	98.0	2,903	871,026
1972-73	2,962	888,705	77.3	2,290	687,042
1973-74	2,962	888,705	37.5	1,111	333,300
1974-75	2,962	888,705	0.8	237	71,103
1975-76	2,962	888,705	0.0	0	0
		$7,976,931			$5,697,540

Note: $2,279,391 is the difference in constant 1968-69 dollars between the cost of the present program if it were to remain fully operational through 1975-76 ($7,976,931), and what it will cost as it is gradually replaced by WETEP ($5,697,540).

*Less than whole dollar amounts have been dropped from columns 1 and 4 to facilitate comparison.

SOURCES OF DATA AND INFORMATION

Advisee Lists, Elementary Education. A compilation of individual faculty members' listings of their advisees, 1967, 13 pp.

Annual Report, 1967-68. Teacher Placement Bureau, University of Wisconsin, 1968, 62 pp.

Annual Student Teaching and Internship Report, 1967-68. Wisconsin Improvement Program, Office of Clinical Experiences for Teachers, June 18, 1968, 6 pp.

Credit Analysis. First and second semester, University of Wisconsin, Madison Campus, November 9, 1967 and February 26, 1968, 16 pp.

Enrollments of Prospective Teachers in Field Experience Programs, 1960-1969. School of Education, Wisconsin Improvement Program, The University of Wisconsin, August, 1968, 6 pp.

Financial Report, 1968. The University of Wisconsin, 1968, 175 pp.

Honorarium Schedule for Cooperating Teachers. The School of Education, Office of Clinical Experiences for Teachers, October, 1968, 1 p.

Proposal for the Formation of a Department of Elementary Education. June, 1967, 21 pp.

Requirement Worksheet for Elementary Education Majors. Department of Curriculum and Instruction, January 13, 1969, 4 pp.

Status Report Intern Placement. Wisconsin Improvement Program, October 1, 1967, 1 p.

Schedule I-C, Instructional Cost Per Credit, School of Education. Comptroller's Office, 1968, 4 pp.

Space Utilization Study, 1967-68. Space Management Agency, a volume of computer print-outs, length unknown.

Student Statistics (no title). Office of the Registrar, student statistics, 1967-68, 39 pp.

PRICING WETEP DEVELOPMENT

LeRoy J. Peterson
Thomas J. Flygare

34/35

Introduction

WETEP development is designed to be completed within a five-year time period beginning September 1, 1970 and extending through August 31, 1975. This section of the report is concerned with the cost of development of instructional program resources and of the various support systems which will accompany WETEP operation. Although it is diffucult to separate the various aspects of the development program, that separation has been made for pricing in this paper. Detailed pricing of module development is undertaken first and is followed by the sections which price media and computer development. The support systems which have been included for pricing in this paper include assessment, faculty in-service education, future-planning, management, and research.

In allocation of costs between development and WETEP operation it was decided to charge the entire cost of these programs to development costs during this five-year period. The rationale for this decision was that while the materials developed, procedures used, and direction given would obviously be directed to the operation of WETEP as portions of the program were implemented, the primary purpose of the activities would be the development of superior learning materials and procedures. These would be produced or designed in the development program, would be tested in the operational program, and brought back to development for further analysis, evaluation and refinement. Within this conceptual framework, the full costs of the programs for the first five years were judged to be most appropriately charged to development. Within this period all aspects of the program move toward full implementation in 1975-76, at which time the full costs of the several activities are charged to WETEP operation.

Module Development

Resources have been identified which will permit the systematic development of instructional modules and elements on a critical time line schedule while the present program is continuing its responsibility of teacher preparation.

It is clear that development must utilize all identified sources and suggestions for improvement including those generated by existent research. Authoritative studies and the best thinking in the field must be added to direct investigation of practical problems and questions for which solutions and answers are not at hand. This is possible only with a research based, heavily research-oriented staff with adequate research assistants and supportive services. These are provided in the identified resources needed for the development stage of WETEP.

Eight resources were identified as essential to the development phase of WETEP. These resources are:

- Professorial time
- Research Assistant time
- Secretarial time
- Consultant time
- Supplies, broadly defined
- Capital equipment
- Office space requirement
- Utilities and related services

These resources, appropriately melded, provide the ingredients for the module development. The manner in which the modules are to be developed can best be viewed through a number of descriptive steps indicating essential activities by time span.

Three academic years have been allotted to the development of each module. The first year will be devoted to refining module specifications. The second year, deemed the crucial year of development and described as the middle year, will see the instructional materials planned and their use inaugurated. Student assessment procedures and materials will also be devised during this second year and tested on a pilot basis in conjunction with the instructional content toward the latter part of the year. In addition, specifications for the media (photography, films, TV, video tapes and computer) supporting the instructional program will be finalized and delivered to the media specialists who will complete the development of the material, consistent with the specifications, by the end of the second year. The third and final year of the three year cycle of module development will be devoted to pilot use and to a review and revision of the module as it emerges from two years of development. Once this step is completed, the module will be ready to contribute to the instructional program of WETEP.

Table I lists the number of modules in each element and the time sequence for their development. With the exception of the five modules scheduled for development in year one and the two modules in science in year five, the modules all are scheduled for their "middle year" of development in the second, third and fourth years. For modules developed in years one and five, that portion of the development which would fall outside the five year period is placed in years one or five. For example, year one is conceived of as the mid-year for development of the first module of art. In this case, all efforts which would normally precede the middle year are accommodated in the provisions for resources for the middle year, i.e., year one. Likewise, for the two modules of science which are assumed to have their middle year in year five, all activities and all resource requirements which would normally follow are encompassed in that year.

TABLE I

SCHEDULE OF MODULE DEVELOPMENT SHOWING MID-YEAR OF 3-YEAR DEVELOPMENT PERIOD FOR EACH MODULE

	No. of Modules	1	2	3	4	5
Communications	21	1	8	4	8	0
Mathematics Education	12	1	1	7	3	0
Science Education	22	0	3	7	10	2
Social Studies Education	9	0	1	3	5	0
Safety Education	19	0	3	9	7	0
Health Education	12	0	2	3	7	0
Leisure Education	10	0	3	5	2	0
Art Education	19	1	4	9	5	0
Music Education	10	0	3	4	3	0
Physical Education	8	0	2	4	2	0
Screening	1	0	0	0	1	0
Orientation	8	0	3	3	2	0
Guidance Education	4	0	1	2	1	0
Media & Technology	9	0	3	5	1	0
Educational Psychology	15	1	4	6	4	0
Curriculum & Instruction	12	0	3	4	5	0
Early Childhood	12	0	3	4	5	0
Culturally Diverse	26	0	4	13	9	0
Special Education	27	1	2	10	14	0
Total	256	5	53	102	94	2
Per Cent of Total	100.0	2.0	20.7	39.8	36.7	0.8

It is apparent from Table I that the development of 256 modules is planned over a five-year period. While the preparation of media materials and assessment procedures is closely associated with module development, these costs are treated separately in this document. What immediately follows is a discussion of the development costs of only the instructional content of the modules.

In the pricing of the development program, the resources essential for the development of each module must be ascertained. Not all modules require the same resources. The resources required for the development of a module vary, depending on whether the module is the first or a subsequent one within the element to be developed. Recognizing that the development of the first module in any element will be more time-consuming in professorial and supportive staff time than subsequent modules, provision for additional resources for the first developed module of each element has been planned. For the first module to be developed in an element, the following personnel resources are allocated:

1st year

    1/3 of a professor's time
    1/2 of a research assistant's time
    1/3 of a secretary's time

2nd year

    1/3 of a professor's time
    1 1/2 of research assistants' time
    1/3 of a secretary's time

3rd year

    1 research assistant's time
    1/3 of a secretary's time

Subsequent modules in each element will have reduced personnel requirements as follows:

1st year

    1/6 of a professor's time
    1/2 of a research assistant's time
    1/6 of a secretary's time

2nd year (mid-year)

    1/6 of a professor's time
    1 1/2 of research assistants' time
    1/6 of a secretary's time

TABLE II

PERSONNEL REQUIREMENTS (EXCLUSIVE OF TECHNOLOGICAL PERSONNEL) FOR THE DEVELOPMENT OF WETEP MODULES

Elements	1970-71			1971-72			1972-73			1973-74			1974-75		
	1			2			3			4			5		
	Prof.	R.A.	Sec.	Prof.	R.A.	Sec.	Prof.	R.A.	Sec.	Prof.	R.A.	Sec.	Prof.	R.A.	Sec.
Communications	2	6	2	2	15	2 1/3	2	18	3 1/3	3 1/3	16	2		8	1 1/3
Mathematics Education	5/6	2 1/2	5/6	1 1/3	6	1 2/3	1 2/3	12	1 5/6	1/2	11 1/2	1 2/3		3	1/2
Social Studies Education	1/3	1/2	1/3	5/6	3	5/6	1 1/3	8	1 2/3	5/6	10 1/2	1 1/3		5	5/6
Science Education	2/3	1 1/2	2/3	1 5/6	8	1 5/6	2 5/6	18 1/2	3 1/2	2	23	3 1/6	1/3	15	2 1/3
Art Education	1 1/3	4	1 1/3	2 1/6	11 1/2	2 1/2	2 1/3	20	3	5/6	16 1/2	2 1/3		5	5/6
Music Education	2/3	1 1/2	2/3	1 1/3	6 1/2	1 1/3	1 1/6	10 1/2	1 5/6	1/2	8 1/2	1 1/6		3	1/2
Physical Education	1/2	1	1/2	1 1/6	5	1 1/6	1	9	1 1/2	1/3	7	1		2	1/3
Health Education	1/2	1	1/2	1	4 1/2	1	1 2/3	10	2 1/6	1 1/6	13 1/2	1 2/3		7	1 1/6
Safety Education	2/3	1 1/2	2/3	2 1/6	9	2 1/6	2 2/3	20	3 1/3	1 1/6	19 1/2	2 2/3		7	1 1/6
Leisure Education	2/3	1 1/2	2/3	1 1/2	7	1 1/2	1 1/6	11 1/2	1 5/6	1/3	8	1 1/6		2	1/3
Screening							1/3	1/2	1/3	1/3	1 1/2	1/3		1	1/3
Orientation	2/3	1 1/2	2/3	1 1/6	7	1 1/6	5/6	8 1/2	1 1/2	1/3	6	5/6		2	1/3
Educational Psychology	1 1/3	4	1 1/3	1 2/3	10	2	1 2/3	15	2 1/3	2/3	12	1 2/3		4	2/3
Guidance Education	1/3	1/2	1/3	2/3	2 1/2	2/3	1/2	4 1/2	5/6	1/6	3 1/2	1/2		1	1/6
Media & Technology	2/3	1 1/2	2/3	1 1/2	7	1 1/2	1	11	1 2/3	1/6	6 1/2	1		1	1/6
Curriculum & Instruction	2/3	1 1/2	2/3	1 1/2	6 1/2	1 1/3	1 1/2	11 1/2	2 1/6	5/6	11 1/2	1 1/2		5	5/6
Early Childhood Education	2/3	1 1/2	2/3	1 1/3	6 1/2	1 1/3	1 1/2	8 1/2	1 1/2	5/6	11 1/2	1 1/2		5	5/6
Culturally Diverse	5/6	2	5/6	3	12 1/2	3	3 2/3	28	4 1/2	1 1/2	26 1/2	3 2/3		9	1 1/2
Special Education	1	3	1	2	9	2 1/3	4	24	4 1/3	2 1/3	31	4		14	2 1/3
Total	14 1/3	36 1/2	14 1/3	28	136 1/2	29 2/3	32 5/6	249	43	16 1/6	244	33 1/6	1/3	99	16 1/2

3rd year

1 research assistant's time
1/6 of a secretary's time

By application of the above requirements for personnel to the schedule of module development, total personnel requirements for the entire development phase was formulated. These are presented in Table II.

Based upon the personnel requirements described for each year in Table II, it was possible to calculate the costs of all the resources required for the developmental phase of WETEP. (See Tables III - XVII) The basis of projection of developmental costs for each category is explained in the following sections.

Faculty Salaries

To arrive at faculty salaries, a decision was made relative to the anticipated professorial mix of the development staff. It was determined that the mix should represent a balanced staff; one-third assistant professors, one-third associate professor and one-third full professors. While this mix may appear to be balanced heavily in the number of assistant professors, as compared with the University as a whole, it is not unreasonable in terms of the increase in number of faculty members throughout WETEP development.

With this mix agreed upon, it was necessary only to average the academic year salaries at the University of Wisconsin for a professor, associate professor and an assistant professor. This was done for 1967-68 salaries to secure the base year data. Projections for future years were made based on the average per cent of increase in actual salaries at the University of Wisconsin since 1961-62. On these bases, anticipated salaries for the years under consideration for average professorial salaries would be:

Year	Average Professorial Salaries in Actual Dollars
1970-71	$15,319
1971-72	16,188
1972-73	17,106
1973-74	18,076
1974-75	19,101

The cost of total professorial salaries as shown in Table III through VII for the development phase was found by multiplying the average salary projected for the designated year by the faculty requirement for that year as identified in Table II.

TABLE III

COST OF MODULE DEVELOPMENT BY ELEMENT IN ACTUAL DOLLARS, 1970-71

Elements	Faculty Salaries (1)	Research Asst. Salaries (2)	Sec'l Salaries (3)	Total Salaries 1-2-3 (4)	Supplies (5)	Capital Equip. (6)	Faculty & Sec'l Space (7)	Research Asst. Space (8)	Total Space Required (9)	Total Lease Cost (10)	Total Util's Cost (11)	Consult. Fees & Expenses (12)	Total, Col. 4,5,6,10, 11, 12 (13)
Communications	30,638	35,496	12,002	78,136	12,814	1,406	480	360	840	4,943	662	3,000	100,961
Mathematics Education	12,761	14,790	4,999	32,550	5,338	586	200	150	350	2,059	276	3,000	43,809
Social Studies Education	5,101	2,958	1,998	10,057	1,649	181	80	30	110	647	87		12,621
Science Education	10,218	8,874	4,003	23,095	3,788	416	160	90	251	1,471	197		28,967
Art Education	20,420	23,664	7,999	52,083	8,542	938	320	240	560	3,295	441	3,000	68,299
Music Education	10,218	8,874	4,003	23,095	3,788	416	160	90	250	1,471	197		28,967
Physical Education	7,660	5,916	3,000	16,576	2,718	298	120	60	180	1,059	142		20,793
Health Education	7,660	5,916	3,000	16,576	2,718	298	120	60	180	1,059	142		20,793
Safety Education	10,218	8,874	4,003	23,095	3,788	416	160	90	250	1,471	197		28,967
Leisure Education	10,218	8,874	4,003	23,095	3,788	416	160	90	250	1,471	197		28,967
Screening													
Orientation	10,218	8,874	4,003	23,095	3,788	416	160	90	250	1,471	197		28,967
Educational Psychology	20,420	23,664	7,999	52,083	8,542	938	320	240	560	3,295	441	3,000	68,299
Guidance Education	5,101	2,958	1,998	10,057	1,649	181	80	30	110	647	87		12,621
Media Technology	10,218	8,874	4,003	23,095	3,788	416	160	90	250	1,471	197		28,967
Curriculum & Instruction	10,218	8,874	4,003	23,095	3,788	416	160	90	250	1,471	197		28,967
Early Childhood Education	10,218	8,874	4,003	23,095	3,788	416	160	90	250	1,471	197		28,967
Culturally Diverse	12,761	11,832	4,999	29,592	4,853	533	200	120	320	1,883	252		37,113
Special Education	15,319	17,748	6,001	39,068	6,407	703	240	180	420	2,471	331	3,000	51,980
Total	219,585	215,934	86,019	521,538	85,534	9,390	3,440	2,190	5,630	33,126	4,437	15,000	669,025
Per Cent of Total	32.8	32.3	12.9	78.0	12.8	1.4				5.0	0.6	2.2	100.0

TABLE IV

COST OF MODULE DEVELOPMENT BY ELEMENT IN ACTUAL DOLLARS, 1971-72

Elements	Faculty Salaries (1)	Research Asst. Salaries (2)	Sec'l Salaries (3)	Total Salaries 1-2-3 (4)	Supplies (5)	Capital Equip. (6)	Faculty & Sec'l. Space (7)	Research Asst. Space (8)	Total Space Required (9)	Total Lease Cost (10)	Total Util's Cost (11)	Consult. Fees& Expenses (12)	Total Col. 4,5, 6,10,11,12 (13)
Communications	32,376	92,880	14,679	139,935	22,949	2,519	520	900	1,420	8,811	1,189	12,000	187,403
Mathematics Education	21,579	37,152	10,489	69,220	11,352	1,246	360	360	720	4,468	603	1,500	88,389
Social Studies Education	13,485	18,576	5,241	37,302	6,118	671	200	180	380	2,358	318	3,000	49,767
Science Education	29,673	49,536	11,533	90,742	14,882	1,633	440	480	920	5,709	770	6,000	119,736
Art Education	35,079	71,208	15,730	122,017	20,011	2,196	560	690	1,250	7,756	1,046	6,000	159,026
Music Education	21,579	40,248	8,387	70,214	11,515	1,264	320	390	710	4,406	594	6,000	93,993
Physical Education	18,891	30,960	7,343	57,194	9,380	1,029	280	300	580	3,599	485	4,500	76,187
Health Education	16,188	27,864	6,292	50,344	8,256	906	240	270	510	3,165	427	4,500	67,598
Safety Education	35,079	55,728	13,635	104,442	17,128	1,880	520	540	1,060	6,577	887	6,000	136,914
Leisure Education	24,282	43,344	9,438	77,064	12,638	1,387	360	420	780	4,840	653	6,000	102,582
Screening													
Orientation	18,891	43,344	7,343	69,578	11,411	1,252	280	420	700	4,344	586	6,000	93,171
Educational Psychology	26,985	61,920	12,584	101,489	16,644	1,827	440	600	1,040	6,453	870	6,000	133,283
Guidance Education	10,797	15,480	4,260	30,537	5,008	550	160	150	310	1,924	259	3,000	41,278
Media Technology	24,282	43,344	9,438	77,064	12,638	1,387	360	420	780	4,840	653	6,000	102,582
Curruculum & Instruction	21,579	40,248	8,387	70,214	11,515	1,264	320	390	710	4,406	594	6,000	93,993
Early Childhood Education	21,579	40,248	8,387	70,214	11,515	1,264	320	390	710	4,406	594	6,000	93,993
Culturally Diverse	48,564	77,400	18,876	144,840	23,754	2,607	720	750	1,470	9,121	1,230	7,500	189,052
Special Education	32,376	55,728	14,679	102,783	16,856	1,850	520	540	1,060	6,577	887	3,000	131,953
Total	453,264	845,208	186,721	1,485,193	243,570	26,732	6,920	8,190	15,110	93,760	12,645	99,000	1,960,900
Per Cent of Total	23.1	43.1	9.5	75.7	12.4	1.4				4.8	0.6	5.1	100.0

TABLE V

COST OF MODULE DEVELOPMENT BY ELEMENT IN ACTUAL DOLLARS, 1972-73

Elements	Faculty Salaries (1)	Research Asst. Salaries (2)	Sec'l Salaries (3)	Total Salaries 1-2-3 (4)	Supplies (5)	Capital Equip. (6)	Faculty & Sec'l Space (7)	Research Asst. Space (8)	Total Space Required (9)	Total Lease Cost (10)	Total Util's Cost (11)	Consult. Fees & Expenses (12)	Total, Col.'s 4,5,6,10, 11,12 (13)
Communications	34,212	116,640	21,981	172,833	28,345	3,111	640	1,080	1,720	11,331	1,529	6,000	223,149
Mathematics Education	28,516	77,760	12,089	118,365	19,412	2,131	420	720	1,140	7,510	1,013	10,500	158,931
Social Studies Education	22,802	51,840	10,994	85,636	14,044	1,541	360	480	840	5,534	747	4,500	112,002
Science Education	48,461	119,880	23,082	191,423	31,393	3,446	760	1,110	1,870	12,320	1,662	10,500	250,744
Art Education	39,908	129,600	19,785	189,293	31,044	3,407	640	1,200	1,840	12,122	1,636	13,500	251,002
Music Education	19,963	68,040	12,089	100,092	16,415	1,802	360	630	990	6,522	880	6,000	131,711
Physical Education	17,106	58,320	9,892	85,318	13,992	1,536	300	540	840	5,534	747	6,000	113, 127
Health Education	28,516	64,800	14,291	107,607	17,648	1,937	460	600	1,060	6,983	942	4,500	139,617
Safety Education	45,622	129,600	21,981	197,203	32,341	3,550	720	1,200	1,920	12,649	1,707	13,500	260,950
Leisure Education	19,963	74,520	12,089	106,572	17,478	1,918	360	690	1,050	6,917	933	7,500	141,318
Screening	5,696	3,240	2,196	11,132	1,826	200	80	30	110	725	98		13,981
Orientation	14,249	55,080	9,892	79,221	12,992	1,426	280	510	790	5,205	702	4,500	104,046
Educational Psychology	28,516	97,200	15,386	141,102	23,141	2,540	480	900	1,380	9,091	1,227	9,000	186,101
Guidance Education	8,553	29,160	5,494	43,207	7,086	778	160	270	430	2,833	382	3,000	57,286
Media and Technology	17,106	71,280	10,994	99,380	16,295	1,789	320	660	980	6,456	871	7,500	132,294
Curriculum & Instruction	25,659	74,520	14,291	114,470	18,773	2,060	440	690	1,130	7,444	1,005	6,000	149,752
Early Childhood Education	25,659	55,080	9,892	90,631	14,863	1,631	360	510	870	5,732	773	6,000	119,630
Culturally Diverse	62,728	181,440	29,678	273,846	44,911	4,929	980	1,680	2,660	17,524	2,365	19,500	363,075
Special Education	68,424	155,520	28,576	252,520	41,413	4,545	1,000	1,440	2,440	16,075	2,169	15,000	331,722
Total	561,659	1,613,520	284,672	2,459,851	403,415	44,277	9,120	14,940	24,060	158,507	21,388	153,000	3,240,438
Per Cent of Total	17.3	49.8	8.8	75.9	12.4	1.4				4.9	0.7	4.7	100.00

TABLE VI

COST OF MODULE DEVELOPMENT BY ELEMENT IN ACTUAL DOLLARS, 1973-74

Elements	Faculty Salaries (1)	Research Asst. Salaries (2)	Sec'l Salaries (3)	Total Salaries 1-2-3 (4)	Supplies (5)	Capital Equip. (6)	Faculty & Sec'l Space (7)	Research Asst. Space (8)	Total Space Required (9)	Total Lease Cost (10)	Total Util's Cost (11)	Consult. Fees & Expenses (12)	Total, Col.'s 4,5,6, 10, 11 & 12 (13)
Communications	24,095	108,512	13,826	146,433	24,015	2,636	400	960	1,360	9,508	1,285	12,000	195,877
Mathematics Education	9,038	77,993	11,524	98,555	16,163	1,774	260	690	950	6,641	898	4,500	128,531
Social Studies Education	15,057	71,211	9,215	95,483	15,659	1,719	260	630	890	6,222	841	7,500	127,424
Science Education	36,152	155,986	21,893	214,031	35,101	3,853	620	1,380	2,000	13,982	1,890	15,000	283,857
Art Education	15,057	111,903	16,128	143,088	23,466	2,576	380	990	1,370	9,578	1,295	7,500	187,503
Music Education	9,038	57,647	8,067	74,752	12,259	1,346	200	510	710	4,964	671	4,500	98,492
Physical Education	6,019	47,474	6,913	60,406	9,907	1,087	160	420	580	4,055	548	3,000	79,003
Health Education	21,095	91,557	11,524	124,176	20,365	2,235	340	810	1,150	8,040	1,087	10,500	166,403
Safety Education	21,095	132,249	18,437	171,781	28,172	3,092	460	1,170	1,630	11,395	1,540	10,500	226,480
Leisure Education	6,019	54,256	8,067	68,342	11,208	1,230	180	480	660	4,614	624	3,000	89,018
Screening	6,019	10,173	2,302	18,494	3,033	333	80	90	170	1,188	161	3,000	26,209
Orientation	6,019	40,692	5,759	52,470	8,605	944	140	360	500	3,496	472	3,000	68,987
Educational Psychology	12,057	81,384	11,524	104,965	17,214	1,889	280	720	1,000	6,991	945	6,000	138,004
Guidance Education	3,019	23,737	3,456	30,212	4,955	544	80	210	290	2,027	274	1,500	39,512
Media & Technology	3,019	44,083	6,913	54,015	8,858	972	140	390	530	3,705	501	1,500	69,551
Curriculum & Instruction	15,057	77,993	10,369	103,419	16,961	1,862	280	690	970	6,781	917	7,500	137,440
Early Childhood Education	15,057	77,993	10,370	103,420	16,961	1,862	280	690	970	6,781	917	7,500	137,441
Culturally Diverse	27,114	179,723	25,350	232,187	38,079	4,179	620	1,590	2,210	15,450	2,088	13,500	305,483
Special Education	42,171	210,242	27,652	280,065	45,931	5,041	760	1,860	2,620	18,316	2,476	21,000	372,829
Total	292,197	1,654,808	229,289	2,176,294	356,912	39,174	5,920	14,640	20,560	143,734	19,430	142,500	2,878,044
Per Cent of Total	10.1	57.5	8.0	75.6	12.4	1.4				5.0	0.7	4.9	100.0

TABLE VII

COST OF MODULE DEVELOPMENT BY ELEMENT IN ACTUAL DOLLARS, 1974-75

Elements	Faculty Salaries (1)	Research Asst. Salaries (2)	Sec'l Salaries (3)	Total Salaries 1-2-3 (4)	Supplies (5)	Capital Equip. (6)	Faculty & Sec'l Space (7)	Research Asst. Space (8)	Total Space Required (9)	Total Lease Cost (10)	Total Util's Cost (11)	Consult. Fees & Expenses (12)	Total, Col.'s 4, 5, 6, 10, 11 & 12
Communications		56,784	9,664	66,448	10,897	1,196	160	480	640	4,753	642		83,936
Mathematics Education		21,294	3,624	24,918	4,087	449	60	180	240	1,782	241		31,477
Social Studies Education		35,490	6,040	41,530	6,811	748	100	300	400	2,971	401		52,461
Science Education	6,367	106,470	16,912	129,749	21,279	2,335	320	900	1,220	9,061	1,224	3,000	166,648
Art Education		35,490	6,040	41,530	6,811	748	100	300	400	2,971	401		52,461
Music Education		21,294	3,624	24,918	4,087	449	60	180	240	1,782	241		31,477
Physical Education		14,196	2,416	16,612	2,724	299	40	120	160	1,188	160		20,983
Health Education		49,686	8,456	58,142	9,535	1,047	140	420	560	4,159	562		73,445
Safety Education		49,686	8,456	58,142	9,535	1,047	140	420	560	4,159	562		73,445
Leisure Education		14,196	2,416	16,612	2,724	299	40	120	160	1,188	160		20,983
Screening		7,098	2,416	9,514	1,560	171	40	60	100	743	100		12,088
Orientation		14,196	2,416	16,612	2,724	299	40	120	160	1,188	160		20,983
Educational Psychology		28,392	4,832	33,224	5,449	598	80	240	320	2,377	321		41,969
Guidance Education		7,098	1,208	8,306	1,362	150	20	60	80	594	80		10,492
Media and Technology		7,098	1,208	8,306	1,362	150	20	60	80	594	80		10,492
Curriculum & Instruction		35,490	6,040	41,530	6,811	748	100	300	400	2,971	401		52,461
Early Childhood Education		35,490	6,040	41,530	6,811	748	100	300	400	2,971	401		52,461
Culturally Diverse		63,882	10,872	74,754	12,260	1,346	180	540	720	5,347	722		94,429
Special Education		99,372	16,912	116,284	19,071	2,093	280	840	1,140	8,467	1,143		147,058
Total	6,367	702,702	119,592	828,661	135,900	14,920	2,020	5,940	7,980	59,266	8,002	3,000	1,049,749
Per Cent of Total	0.6	66.9	11.4	78.9	13.0	1.4				5.6	0.8	0.3	100.0

Research Assistants

The calculations of the salaries for research assistants (R.A.) were based upon the actual R.A. salary schedule from 1961-62 through 1969-70. The average annual rate of increase for this nine-year period (approximately 4.6%) was used to project the average R.A. salary through the development phase.

Reference to one research assistant means one full-time equivalent (F.T.E.) R.A. working for a forty-hour week. Typically, the R.A. is on a half-time appointment while attending graduate school. Thus, two half-time R.A.'s would be required to fulfill the requirements of one full-time equivalent R.A. Based upon past salaries, the salaries of full-time equivalent R.A.'s would be as follows during the development phase in actual dollars:

Year	Average Salary of Research Assistant
1970-71	$5,916
1971-72	6,192
1972-73	6,480
1973-74	6,782
1974-75	7,098

The above figures were multiplied by the number of research assistants shown in Table II to arrive at the cost of research assistants in the development program. Because of the nature of the development program of WETEP, research assistant resource costs constitute a large share of the total.

Secretarial Salaries

Secretarial salaries for the development phase were projected at the pay scale for Stenographer II at the University of Wisconsin. The salary for a Stenographer II is a middle rank in the stenographical and clerical pay scale. This salary level will provide a balanced secretarial staff in the development operation. The same base year was taken as in the other computations (1967-68) and the annual rate of increase since 1961-62 was used to arrive at actual dollar amounts. This projection resulted in the following salary levels for secretaries to be paid during the development phase:

Year	Average Salary of Secretarial Staff
1970-71	$6,001
1971-72	6,292
1972-73	6,595
1973-74	6,913
1974-75	7,248

Total secretarial salary costs for module development were obtained by applying the salary levels shown above to the secretarial requirements presented in Table II.

Cost of Supplies

Supplies, as the term is employed in University of Wisconsin accounting, has a much broader meaning than is usually assumed. In addition to including what is normally categorized as supplies such as paper and pencils, this category includes the cost of telephones, travel expenses, data processing costs, duplications and printing, and many other miscellaneous items.

The cost of supplies for WETEP was determined by identification of a university agency with functions similar to those proposed for WETEP during the development phase and using the same relationship of salary cost to supplies. The Research and Development Center for Cognitive Learning at the University of Wisconsin appeared to embrace a number of similar and closely related functions. Excellent cost records for this operation were available. Through analysis of the Center's budgets, it was determined that the equivalent of 16.4% of the total expended in 1968-69 for salaries and wages was expended for supplies, broadly defined. Thus, the figures for supplies were obtained by applying the 16.4% to the total salaries and wages (excluding consultants). Since salaries and wages were calculated to increase each year, the same constant per cent (16.4%) could be applied each year to arrive at dollar costs.

Cost of Capital Equipment

Capital Equipment as described in university accounting represents items which cost more than $20 and last longer than 5 years, such as duplicating machines and typewriters. For WETEP to obtain the anticipated cost of capital equipment for development it again was decided to use the same per cent of salaries as in the Research and Development Center. In 1968-69, the Research and Development Center spent the equivalent of 1.8% of the total expended for salaries and wages for capital equipment. This figure was used in calculating the capital equipment cost for module development in WETEP. As was true of supplies, a constant per cent could be applied since the base of salaries and wages had been increased each year to arrive at the actual dollar costs.

Space Required

Space requirements were calculated for professors, research assistants and secretaries during the development phase. New construction at the University generally allows 120 sq. ft. per professor and secretary. Following that rule, 120 was multiplied by the number of required professors and secretaries as shown in Table II to arrive at the space requirement. A separate calculation was made of the space requirements for the research assistants for the WETEP development phase.

While no general rule exists at the University of Wisconsin for space allocations for R.A.'s, it was decided that two full-time equivalent R.A.'s would be assigned the same amount of space as one professor. Since two full-time research assistants are likely to be four different people, this may appear an unsatisfactory assignment of space. Nonetheless, within the concept of intensive utilization of space this allocation appears justifiable. Under this allocation, each full-time equivalent research assistant would be assigned 60 square feet. This multiplied by the number of R.A.'s listed in Table II results in the space requirements for R.A.'s.

Cost of Space

The space requirements for all personnel were combined for the total square footage of space required for the development phase of WETEP. At this time, there appears to be satisfactory space which will be available to house the development phase of WETEP. It was therefore decided to make the cost projections for development space on the assumption that all of the required space for offices for the development phase would be leased. The space management agency of the University advises that $5.50 per square foot per year is the average cost of leasing desirable office space during the 1969-70 academic year, near the university campus. This price allows for some remodeling of the space making it appropriate for WETEP development. This price, however, will be subject to increases in the future due to inflation and other factors increasing the cost of facilities. This increase will be recognized in this calculation, as elsewhere, in the cost of analysis volume by using the average cost of Education Index rate of 1.0626.* Applied to the average 1968-69 lease cost of $5.50, the growth rate would result in the actual dollar per square foot lease cost during the development phase shown below:

Year	Cost Per Square Foot of Leased Space
1970-71	$5.884
1971-72	6.205
1972-73	6.588
1973-74	6.991
1974-75	7.427

The appropriate figure above multiplied by the total space requirement resulted in the cost of leasing the required space for each year of WETEP development.

---

* Basis for projecting cost by use of the Education Index is explained in Appendix VII.

Utilities and Other Expenses of Leased Space

Even when the university leases space, certain additional expenses are incurred in connection with the space used by university personnel. In a study conducted in 1968-69, utilities and other expenses paid by the university generally amount to $.698 per square foot of leased space. This cost can also be expected to increase in the future and the cost of Education Index was applied to obtain the cost figures for subsequent years in actual dollars. The projection of these increases resulted in the following utilities cost per square foot during the development phase:

Year	Added Costs of Leased Space
1970-71	$.788
1971-72	.837
1972-73	.889
1973-74	.945
1974-75	1.003

The appropriate figures above applied to the total square footage resulted in the total utilities costs for each year of the development phase.

Consultant Costs

Outside consultants will be called upon frequently to advise the University of Wisconsin faculty on specific aspects of the development of instructional modules. It was decided that 12 consultant days would be required to assist in the development of each of the modules which are the first to be developed within each of the 19 elements. For each of the remaining modules in each element, 6 consultant days would be required. It was estimated that consultant fees and expenses would average $250 per day over the entire period. Thus, if the module was the first in its element to be developed, as are all five of the modules in 1970-71, a cost of $3000 per module would be incurred for consultants. If it is one of the remaining modules in the element, a cost of $1500 would be incurred.

Annual or Academic Salaries

In the previous calculations salaries for professorial staff and research assistants were calculated on an academic year basis since this is the typical pattern of employment at Wisconsin. During the period of development it is anticipated that most if not all of the staff will be employed on a full year basis. Therefore, the staff including professors and research assistants are employed on a full year basis within the pattern of academic year plus summer session, the salaries will be increased by 2/9, adding the following amounts to development costs based on the number of staff and research assistants shown in Table II. Hereafter, all development costs will include the cost of summer session employment.

Added Cost of Summer Employment in Actual Dollars

Year	Professorial Staff	Research Assistants	Total
1970-71	48,747	47,925	96,672
1971-72	100,632	187,688	288,320
1972-73	124,700	358,311	483,011
1973-74	64,874	367,464	432,338
1974-75	1,412	156,024	157,436
Total	340,365	1,117,412	1,457,777

Added Cost for Summer Employment in Constant 1968-69 Dollars

Year	Professorial Staff	Research Assistants	Total
1970-71	43,658	43,764	87,422
1971-72	85,288	163,664	248,952
1972-73	100,009	298,551	398,560
1973-74	49,242	292,556	341,798
1974-75	1,014	118,701	119,715
Total	279,211	917,236	1,196,447

The cost for development for each year calculated as described in the preceding section by modules is shown in tabular form in the following tables. The anticipated cost of development for 1970-71 is shown in Table III; for 1971-72 in Table IV, etc. The total cost by year and function are brought together in Table VIII. A review of Table VIII indicates that the costs vary from $765,697 in 1970-71 to $3,723,449 in 1972-73. The total cost of module development during the five-year development period including summer sessions is $11,255,933.

TABLE VIII

TOTAL COST OF MODULE DEVELOPMENT BY YEAR IN ACTUAL DOLLARS

Year	Faculty Salaries (1)	R.A. Salaries (2)	Secretary Salaries (3)	Total Salaries (4)	Supplies (5)	Capital Equipment (6)	Total Lease Cost (7)	Total Utilities Cost (8)	Consultants' Fees & Expenses (9)	Summer Sessions (10)	Total Columns 4. 5,6,7.8 9.10 (11)
1970 - 71	219,585	215,934	86,019	521,538	85,534	9,390	33,126	4,437	15,000	96,672	765.697
1971 - 72	453,264	845,208	186,721	1,485,193	243,570	26,732	93,760	12,645	99,000	288,320	2,249,220
1972 - 73	561,659	1,613,520	284,672	2,459,851	403,415	44,277	158,507	21,388	153,000	483,011	3,723.449
1973 - 74	292,197	1,654,808	229,289	2,176,294	356,912	39,174	143,734	19,430	142,500	432,338	3.310,382
1974 - 75	6,367	702,702	119,592	828,661	135,900	14,920	59,266	8,002	3,000	157,436	1,207,185
Total	1,533,072	5,032,172	906,293	7,471,537	1,225,331	134,493	488,393	65,902	412,500	1,457,777	11.255,933

TABLE IX

TOTAL COST OF MODULE DEVELOPMENT BY YEAR IN CONSTANT 1968-69 DOLLARS

Year	Faculty Salaries (1)	R.A. Salaries (2)	Secretary Salaries (3)	Total Salaries (4)	Supplies (5)	Capital Equipment (6)	Total Lease Cost (7)	Total Utilities Cost (8)	Consultants' Fees & Expenses (9)	Summer Sessions (10)	Total Columns 4, 5,6,7,8,9,10 (11)
1970 - 71	196,593	98,550	77,554	372,697	61,122	6,708	29,143	3,930	12,000	87,422	573,022
1971 - 72	384,132	368,550	160,574	913,256	149,774	16,439	78,205	10,546	79,200	248.952	1,496,372
1972 - 73	450,395	672,300	232,716	1,355,411	222,287	24,397	122,746	16,780	122,400	398,560	2,262,581
1973 - 74	221,699	658,800	179,462	1,059,961	173,834	19,079	106,416	14,351	114,000	341.798	1,829,439
1974 - 75	4,527	267,300	89,298	361,125	59,225	6,500	41,199	5,556	2,400	119,715	595,720
Total	1,257,346	2,065,500	739,604	4,062,450	666,242	73,123	377,709	51,163	330,000	1,196.447	6,757,134

The costs in constant 1968-69 prices are presented in Table IX. This information indicates the cost of the personnel and supportive costs, less anticipated inflation and other factors influencing the upward trend in costs. The cost of development on this basis including summer sessions is $6,757,134.

Tables X and XI summarize the cost of the development of modules by elements. Table X carries the cost summary through the five years using the anticipated actual cost in each of those years. Table XI presented the same information using constant 1968-69 dollars. The difference between the two totals is anticipated inflation and other factors of increased costs.

Pricing of WETEP Support Systems During Development Phase

Development of WETEP support systems will be progressing concurrently with module development. These additional systems include:

- Computer
- Media
- Assessment
- Faculty In-Service
- Future-Planning Unit
- Management System
- Research Center

The pricing of each of the support systems is derived from material in associated chapters in Volume V of this report. The procedure used in the pricing of these systems is described in the following sections of this paper.

TABLE X

SUMMARY OF MODULE DEVELOPMENT BY ELEMENT IN ACTUAL DOLLARS

	Element	1970-71	1971-72	1972-73	1973-74	1974-75	Total Academic Year	Summer Sessions	Total Academic Yr. & Summer	Percent of Total
1.	Communications	100,961	187,403	223,149	195,877	83,936	791,326	118,080	909,406	8.1
2.	Mathematics Education	43,809	88,389	158,931	128,531	31,477	451,137	67,058	518,195	4.6
3.	Social Studies Education	12,621	49,767	112,002	127,424	52,461	354,275	52,480	406,755	3.6
4.	Science Education	28,967	119,736	250,744	283,857	166,648	849,952	126,827	976,779	8.7
5.	Art Education	68,299	159,026	251,002	187,503	52,461	718,291	106,417	824,708	7.3
6.	Music Education	28,967	93,993	131,711	98,492	31,477	384,640	56,853	441,493	3.9
7.	Physical Education	20,793	76,187	113,127	79,003	20,983	310,093	46,649	356,742	3.2
8.	Health Education	20,793	67,598	139,617	166,403	73,445	467,856	69,973	537,829	4.8
9.	Safety Education	28,967	136,914	260,950	226,480	73,445	726,756	107,876	834,632	7.4
10.	Leisure Education	28,967	102,582	141,318	89,018	20,983	382,868	56,853	439,721	3.9
11.	Screening			13,981	26,209	12,088	52,278	7,289	59,567	.5
12.	Orientation	28,967	93,171	104,046	68,987	20,983	316,154	46,649	362,803	3.2
13.	Educational Psychology	68,299	133,283	186,101	138,004	41,969	567,656	84,551	652,207	5.8
14.	Guidance Education	12,621	41,278	57,286	39,512	10,492	161,189	24,782	185,971	1.7
15.	Media and Technology	28,967	102,582	132,294	69,551	10,492	343,886	51,022	394,908	3.5
16.	Curriculum and Instruction	28,967	93,993	149,752	137,440	52,461	462,613	68,516	531,129	4.7
17.	Early Childhood	28,967	93,993	119,630	137,441	52,461	432,492	64,142	496,634	4.4
18.	Culturally Diverse	37,113	189,052	363,075	305,483	94,429	989,152	147,236	1,136,388	10.1
19.	Special Education	51,980	131,953	331,722	372,829	147,058	1,035,542	154,524	1,190,066	10.6
	TOTAL	669,025	1,960,900	3,240,438	2,878,044	1,049,749	9,798,156	1,457,777	11,255,933	100.0

TABLE XI

SUMMARY OF MODULE DEVELOPMENT BY YEAR IN CONSTANT 1968-69 DOLLARS

Elements	1970-71 Cost	1971-72 Cost	1972-73 Cost	1973-74 Cost	1974-75 Cost	Total Academic Year	Total Summer Sessions	Total	Per Cent of Total
Communications	73,326	119,752	128,617	101,160	38,080	460,935	99,305	560,240	8.3
Mathematics Education	32,544	56,134	91,337	66,944	14,280	260,745	56,233	316,978	4.7
Social Studies Education	9,226	31,186	65,241	65,456	23,800	194,909	41,876	236,785	3.5
Science Education	20,881	76,093	143,530	147,276	75,685	463,465	99,305	562,770	8.3
Art Education	49,531	101,041	143,530	96,697	23,800	414,599	89,733	504,332	7.5
Music Education	20,881	59,876	76,425	50,579	14,280	222,041	47,858	269,899	4.0
Physical Education	15,054	48,649	65,241	40,166	9,520	178,630	38,286	216,916	3.2
Health Education	15,054	43,660	80,153	86,283	33,320	258,470	55,036	313,506	4.6
Safety Education	20,881	87,319	150,986	117,524	33,320	410,030	88,537	498,567	7.4
Leisure Education	20,881	64,866	82,017	46,117	9,520	223,401	47,858	271,259	4.0
Screening			7,456	13,389	5,236	26,081	5,982	32,063	.5
Orientation	20,881	59,876	59,649	35,703	9,520	185,629	39,483	225,112	3.3
Educational Psychology	49,531	84,825	106,249	71,407	19,040	331,052	71,787	402,839	6.0
Guidance Education	9,226	26,196	33,552	20,827	4,760	94,561	20,340	114,901	1.7
Media and Technology	20,881	64,866	76,425	35,703	4,760	202,635	43,072	245,707	3.6
Curriculum and Instruction	20,881	59,876	85,745	71,407	23,800	261,709	56,233	317,942	4.7
Early Childhood	20,881	59,876	68,969	71,407	23,800	244,933	52,644	297,577	4.4
Culturally Diverse	27,194	119,752	208,770	157,690	42,841	556,247	119,645	675,892	10.0
Special Education	37,877	83,577	190,130	191,906	66,641	570,625	123,234	693,365	10.3
Total	485,601	1,247,420	1,864,022	1,487,641	476,003	5,560,687	1,196,447	6,757,134	

Pricing the Computer Component

WETEP has been designed to include the maximum utilization of existing technology and to generate the capability of integrating other technological advances as soon as they are identified. The importance of technology to the development of WETEP and the various alternate plans for utilization, have been explored previously.[1] This section will indicate the cost of the computer component with special detail analysis of an illustrative example.

The proposed timing of the installation and operation of the computer component must be considered in conjunction with its pricing. The year 1970-71 is essentially a year of planning. The development staff would be actively at work, determining in specific terms the potentials of the computer component. For this purpose a major part of the computer data processing staff would be employed. Salaries of data processing staff would total $137,000 which represents the total disbursement for the computer component for this year.[2]

A major objective of this first year's work will be to initiate a continuing study designed to investigate management needs and their alternative solutions in terms of whatever computer facilities may be required. The tentative position taken in this report is that computer facilities will be required and an illustrative procedure has been delineated and priced.

In 1971-72 it is anticipated that the installation of the computer component equipment will be underway. Most of the costs of this facility must be paid in this year. However, to arrive at a comparable annual cost it is necessary to spread the cost over the period of time used. Since the operational costs may form a distinctly different pattern than such costs as development, transportation, and installation, these costs are spread equally over the years of development. Some time is obviously required for installation of the computer equipment so the full year's utilization is not contemplated. The maintenance, rental, etc. for this first year is based on a nine month program. The staff contemplates that in 1972-73 full-time operation of the computer component will be required in the development of WETEP. In 1975-76 full utilization of the computer is anticipated in the implemented WETEP program.

---

[1] Charles D. Sullivan, et al., "An Analysis of Technological Facilities Required for WETEP," WETEP Feasibility Study, Vol. V: Program and Support Systems, School of Education, University of Wisconsin, Madison, 1969, pp. 305-382.

[2] Ibid. p. 378.

Capital Equipment. A variety of dimensions were analyzed to determine the alternative costs of providing the computer component for WETEP. Three of these were more applicable than the others and are presented in detail in this report. They are:

Plan 1 - Cash Sales Purchase
Plan 2 - Conditional Sale and Security Agreement
Plan 3 - Equipment Lease and Service Agreement

Each of these plans was analyzed with regard to the cost of computer equipment and the annual costs for all related equipment. In addition, computer costs including salary scale and time allotment for data processing personnel from 1970-71 through 1975-76 were projected for the plan which appears at this time to be most feasible for WETEP.

It is to be understood that the first five years of computer component costs[3] are to be chargeable to development and the sixth year (1975-76) to the operation of a fully implemented WETEP.

Plan 1 Illustrative Cash Sales Purchase. The cash purchase price of a computer under this plan may be expected to be $1,655,010 to which an estimated $2,500 for transporting (shipping) the computer component to Wisconsin must be added. The transportation cost is assumed to cover preparation for shipment, drayage, etc. The cost of installation is estimated at $2,500. To these amounts are to be added the cost for raising and supporting the floor--$22,680; a cooling system capable of producing 20 tons of air conditioning--$14,000; three key tapes at $24,900 and a key punch for $3,600 for a total capital outlay of $1,725,190. To these costs must be added the cost of items to be purchased on an annual basis: Disc packs at $11,000; magnetic tapes at $5,000 and miscellaneous supplies at $24,000 for a total of $40,000 annually. The cost of maintaining the equipment, personnel to operate it, and leased space to house it also are required. These costs will be presented in detail in connection with Plan 3. These amounts are comparable for all plans.

Plan 2 Illustrative Conditional Sales and Security Agreement. Plan 2 is in reality a variation of Plan 1 except the purchase price may be paid in three, five, six, or seven year periods. If paid over a three year period, finance charges of $157,554 would be added increasing the cost from $1,655,010 to $1,812,564 (Table XII). This amount could be paid in 36 monthly installments of $50,349 per month. If a five year payment plan is used, the finance charges would be $264,750 for a total of $1,919,760. This amount paid in 60 monthly payments would be $31,996 per month.

If the cost of the computer is to be financed over a six year period, a down payment of ten per cent is required. Thus, $165,501 would be paid immediately upon purchase and the amount to be financed

---

[3] Ibid p. 379.

TABLE XII

COST OF CONDITIONAL SALE & SECURITY AGREEMENT

	Years of Amortization			
	Three	Five	Six	Seven
List Sale Price	$1,655,010	$1,655,010	$1,655,010	$1,655,010
Less: Down Payment			165,501	248,251
Balance	$1,655,010	$1,655,010	$1,489,509	$1,406,759
Finance Charge	157,554	264,750	338,931	435,025
Deferred Time Balance	1,812,564	1,919,760	1,828,440	1,841,784
Plus: Down Payment			165,501	248,251
TOTAL PAYMENT	$1,812,564	$1,919,760	$1,993,941	$2,090,035
Monthly Payments	$ 50,349	$ 31,996	$ 25,395	$ 21,926
Total Equipment & Financing	$1,812,564	$1,919,760	$1,993,941	$2,090,035

would be $1,489,509, i.e., $1,655,010 - $165,501. The financing cost over a six year period of $338,931 brings the total cost including the down payment to $1,993,941, and the amount to be financed is $1,828,440. If this amount is paid over 72 months, the monthly payment would be $25,395 per month.

When the cost is paid over a seven year period, a down payment of $248,251 is required. This amount reduces the total to be financed to $1,406.759. The finance charges are $435,025 which gives a total of $1,841,784 to be financed. Financed over 84 monthly payments, the monthly cost is $21,926. The total cost under this plan is $2,090,035 including the original cost and the finance charges. Thus, in spite of lower monthly payments, the total cost is substantially higher for the longer term payments. The costs of purchase is shown in tabular form for amortization over three, five, six, or seven years.

In addition to the purchase price and financing, the other costs included in Plan 1 must be added. These costs are constant regardless of the conditional Sales and Security Agreement used. These items together with the costs are summarized in Table XIII.

TABLE XIII

COST OF INSTALLATION AND RELATED COSTS OF THE COMPUTER COMPONENT

Item	Estimated Cost
Transportation	$ 2,500
Installation	2,500
Raising and Supporting Floor	22,680
Air Conditioning	14,000
Three Key Tapes	24,900
Key Punch	3,600
Disc Packs	11,000
Magnetic Tape	5,000
Misc. Computer Supplies	24,000
Total	$110,180

The above amount is to be added to the figures in Table XII to arrive at the total cost of the computer component for Plan 2 amortized over the varying years. In addition, the cost of maintenance of the equipment, personnel to operate it, and space to house it as shown in Plan 3 must be included for a total cost figure.

Plan 3 Illustrative Equipment Lease and Service Agreement. Plan 3 is established within the fraemwork of a seven year lease period with the option of paying on either a monthly or annual basis. The cost over a seven year period paid monthly at $24,511 per month for 84 months is $2,058,924. Paid annually over the same period of time is $286,064 per year for a total of $2,002,448. The monthly payment plan of $24,511 per month was accepted for illustrative development in this report. The items of costs of this plan if initial installation and transportation charges were spread over the last four years of development would be as follows:

TABLE XIV

ANNUAL COST OF COMPUTER COMPONENT

Item	Estimated Cost
Transportation	$ 625
Installation	625
Raising and Supporting Floor	5,715
Air Conditioning	3,500
Three Key Tapes	6,225
Key Punch	900
Disc Packs	11,000
Magnetic Tape	5,000
Misc. Computer Supplies	24,000
Lease Cost of Space*	12,310
Computer Rental*	312,545
Annual Maintenance*	57,741
Data Processing Personnel*	365,000
TOTAL ANNUAL COST	$805,186

* The annual costs are for 1972-73 the first year of a full 12 month operation of the computer component.

Data Processing Personnel

Personnel needs for the development phase of WETEP are identified in Table XV. They have been derived from the Sullivan, et al. report and reflect the development plans as indicated in the PERT/CPM document.[4] These needs are indicated for each of the five development years and salary estimates are based on the data shown in Table XVI.

Summary of Computer Development Costs

A review of the several plans indicates that Plan 1, the cash sale purchase, would be the most economical. However, it may not be the most feasible in terms of the amount of initial outlay, certainty of WETEP requirements, or access to changing equipment of the most modern type in use or being designed.

Plan 2 would eliminate the necessity of a large initial outlay of cash but would not remove the possibility of purchasing and completing payment of a model which may have become obsolete by introduction of new generations of computers.

Plan 3 seems capable of greater compatibility with WETEP because of the flexibility it allows for designing the requirement needs as the program develops. Lease options usually permit the termination of the lease with prior notice after one year, or on any anniversary date which would assure the use of the latest generation of computers and other equipment available.

Since this plan appears most consonant with the concepts of WETEP, the estimated cost for the several years of operation to 1975-76 were calculated for illustrative purposes. These are shown in Table XIV for the five years of development and the one year of operation of the fully implemented WETEP program.

Table XVII shows the cost for 1970-71 of the data processing staff employed in year one. The staff employed during this year are less than half the staff employed in other years and is limited to those essential for support of a sound planning function.

During the next year, 1971-72, one fourth of the cost of procurement, installation, etc. of the computer component is added as are the costs of supplies, leased space, etc. Computer rental, maintenance and space areincluded for a nine month period. The stepped-up number and cost of staff reflected the increased activities of this year. In 1972-73 and subsequent years the full twelve months of costs are recorded. The "Total Development Cost" column shows the total cost of the computer component for development divided by the types of categories previously discussed.

---

[4] Donald McIsaac, "WETEP PERT/CPM Procedures," WETEP Feasibility Study, Vol. V: Program and Support Systems, 1969.

TABLE XV

DATA PROCESSING PERSONNEL NEEDS DURING DEVELOPMENT PHASE

Position	Year 1	Year 2	Year 3	Year 4	Year 5
Data Processing Director	1.0	1.0	1.0	1.0	1.0
Secretary	1.0	1.0	2.0	2.0	2.0
Systems Analyst	2.2	3.0	3.0	3.0	2.0
Systems Manager	0.9	1.0	1.0	1.0	1.0
Systems Programmer	3.2	6.0	6.0	4.0	3.0
Operations Manager	0.5	1.0	1.0	1.0	1.0
Applications Programmer	1.2	5.0	5.0	6.0	4.0
Documentation Clerk	0.6	2.0	2.0	2.0	2.0
Operating System Programmer	0.0	1.0	1.0	1.0	1.0
Operator	0.0	0.8	1.5	2.0	3.0
Key Puncher	0.6	2.7	4.0	3.0	3.0
Coding Clerk	0.0	1.0	2.0	1.0	1.0
Input/Output Clerk	0.0	0.0	1.0	2.0	2.0
Librarian	0.0	0.0	1.0	1.0	1.0
Total Staff	11.2	25.5	31.5	30.0	27.0
Estimated Salaries	$137,000	$300,000	$365,000	$365,000	$340,000
Total Salaries over 5-year period				$1,507,000	

TABLE XVI

ESTIMATED YEARLY SALARY OF DATA PROCESSING PERSONNEL

Personnel	Yearly Salary [*]
Director	$25,000
Systems Manager	17,000
Operations Manager	15,000
Systems Analyst	14,000
Senior Programmer	15,000
System Programmer	14,000
Operating System Programmer	14,000
Application Programmer	12,000
Lead Computer Operator	10,000
Computer Operator	9,000
Data Conversion Supervisor	8,000
Secretary	8,000
Key Puncher	8,000
Input/Output Control Clerk	7,000
Documentation Clerk	7,000
Librarian	10,000
Coding Clerk	6,000

[*] These salaries are estimated at current levels.

TABLE XVII

ESTIMATED COST OF COMPUTER COMPONENT DEVELOPMENTAL AND OPERATIONAL

Factor	Development Cost 1970-71	Development Cost 1971-72	Development Cost 1972-73	Development Cost 1973-74	Development Cost 1974-75	Total Development Cost	Operational Cost 1975-76	Total Operational & Development
Transportation		625	625	625	625	2,500		2,500
Cost of Installation		625	625	625	625	2,500		2,500
Raising & Supporting Floor		5,715	5,715	5,715	5,715	22,860		22,860
Air Conditioning		3,500	3,500	3,500	3,500	14,000		14,000
Three Key Tapes		6,225	6,225	6,225	6,225	24,900		24,900
Key Punch		900	900	900	900	3,600		3,600
Disc Packs		11,000	11,000	11,000	11,000	44,000	1,650	45,650
Magnetic Tape		5,000	5,000	5,000	5,000	20,000	500	20,500
Miscellaneous Supplies		24,000	24,000	24,000	24,000	96,000	24,000	120,000
*Computer Rental		220,598	312,545	332,104	352,900	1,218,147	294,132	1,512,279
Maintenance		40,754	57,741	61,354	65,196	225,045	54,339	279,384
**Space Costs for 1,620 sq. ft.		8,687	12,310	13,073	13,900	47,970	14,761	62,731
Data Processing Personnel	137,000	300,000	365,000	365,000	340,000	1,507,000	338,000	1,845,000
Total	137,000	627,629	805,186	829,121	829,586	3,228,522	727,382	3,955,904

*Paid over a seven year period

**Includes rental cost plus associated costs per square feet projected at 1.0626 over preceding year

Computer Component for Implemented WETEP

In arriving at the cost of the computer for a fully implemented WETEP it is assumed that the transportation costs, installation costs, preparation of space, and air conditioning have been amortized. This assumes that the computer is at hand, ready for further use, if desired, in the WETEP implemented program.

Within this concept costs for the 1975-76 WETEP operation include the following:

Item	Cost	Quantity	Total Cost
Disc Packs	$550	3	$ 1,650.00
Magnetic Tape	20	25	500.00
Miscellaneous Supplies			24,000.00

It is estimated that the following annual rentals and maintenance for hardware will prevail.

Hardware	Annual Rental	Annual Maintenance
Central Processor and Appropriate Features	$164,196	$21,501
Magnetic Storage Devices	82,020	19,695
Input/Output Devices	21,144	7,935
Communications Interface	26,772	5,208
Totals	$294,132	$54,339

The space required will be the same as in earlier years but the cost is expected to be higher resulting in a cost of $14,761 in 1975-76. The cost of data processing personnel would decline slightly from the previous years due to reduction in personnel employed. The total cost of the computer component for the 1975-76 school year with WETEP fully implemented is $727,382.

Pricing the Media Component

The WETEP instructional program relies heavily on media for the presentation of instructional materials. Therefore, the planning, development, and revision of media will be an activity requiring extensive resources during the development phase of WETEP.

Three areas of media cost are discussed here: the cost of locally producing media planned by the WETEP staff, the cost of purchasing commercially produced media, and the capital costs of equipment necessary to support media presentation in the instructional program. This pricing of media to be considered for use in the WETEP project is tentative. Projected costs presented here are estimates based on current pricing structures and estimates of their increases.

Media Production

The schedule for media production will reflect the extent of program development efforts required in each year of development. The percentages of the program which will be developed in each of the five years are shown below:

Year	Per Cent
1970-71	2.0
1971-72	20.7
1972-73	39.8
1973-74	36.7
1974-75	.8
	100.0

The total requirements for media production over the five year development period have been determined from an examination of the numbers of mediated instructional presentations as described in program specifications. A summary of the total number of items to be developed is presented in Table XVIII.

TABLE XVIII [5]

NUMBER OF MEDIA ITEMS TO BE DEVELOPED LOCALLY

Mode	Presentation Time - Length in Minutes							Total
	0-5	6-10	11-15	16-20	21-40	41-60	61-90	
Video Tapes	269	17	65	37	250	36	1	675
Films		223	60	85	30	4	-	
Slide Sets	155	115	55	25	40	14	-	404
Audio Tapes	22	2	36	18	8	26	4	116
Slide/Tape	-	-	6	6	85	25	-	122
Programmed Instruction	22	74	192	35	184	42	5	554
Computer Aided Instruction	189	84	217	29	113	17	-	649

---

[5] These figures correspond to similar figures presented in the Sullivan, et al., paper. They are based on extensive data provided by the respective element committees for all modules in the program.

To determine faculty requirements for media production, it was necessary to estimate time requirements for the production of each item identified in Table XVIII. For this purpose, all media were grouped into two length categories--those programs of less than ten minutes and those of more than ten minutes. The data in Table XIX reflect an extension of the number of items in each category to an estimated faculty man-hours per item and ultimately man-hours per year of media production.

Assuming a 48-week work year (academic year plus summer) and a 40-hour work week for faculty members, the working time available to each faculty member is 48 x 40 = 1,920 hours/year. The average number of faculty members required to produce mediated instructional materials is thus found to be 10,994/1920 = 5.73. The work would probably be done by a larger number of people, each of whom devotes only part of his time to media production. It is noteworthy that more than half of the total effort, amounting to an average of 6824/1920 - 3.56 people, is required for interactive instruction (P. I. and C. A. I.).

Each of the media items may be expected to require the use of graphic and alphanumeric displays. Estimated use of these displays is indicated in Table XX. Determination of the specific data in that Table are clarified in the following sets of notes which are designed to accompany Table XX.

1. For short video tapes, it is assumed that much of the time will be devoted to views of people or real-life objects, but allowance is made for two alphanumeric title cards and approximately one "graphic" (such as a mounted photograph or a piece of art work) per minute.

2. For short films, it is assumed that there would be somewhat less time spent viewing people (to minimize lip-sync problems), so there would be slightly greater need for graphic arts.

3. For short sequences of still pictures (slide sets or filmstrips), it is assumed that pictures are viewed at an average rate of 3 per minute, and that 1/3 of the total are of alphanumeric nature.

4. Longer video tapes are assumed to require 4 title cards and other "graphics" at an average rate of one every 2 minutes.

5. Longer films are assumed to require 4 title cards and other "graphics" at an average rate of one every 1½ minutes.

6. Slide sets are assumed to consist of an average of 3 pictures per minute, approximately 28% of which are alphanumeric in character.

7. Slide sets with an audio tape narrative are assumed to consist of an average of 2 slides per minute; approximately 28% of the slides are assumed to be alphanumeric.

TABLE XIX

ESTIMATES OF FACULTY TIME REQUIREMENTS FOR MEDIA PRODUCTION

Medium	Total Items	Average Item Per Year	Average Length (Minutes)	Estimated Faculty Man-Hour Per Item	Faculty Man-Hour Per Year
A. Audio-visual programs of less than 10 minutes					
Video Tapes	286	57	4.25	6	342
Films	522	104	5.71	8	832
Slide Sets	270	54	5.71	4	216
Audio Tapes	24	5	4.33	4	20
Sub-Total					1,410
B. Audio-visual programs of more than 10 minutes					
Video Tapes	389	78	28.2	16	1248
Films	179	36	19.0	24	864
Slide Sets	134	27	22.9	8	216
Audio Tapes	92	18	28.6	8	144
Slide Tape Sets	122	24	32.7	12	288
Sub-Total					2,760
C. Other Media					
P. I.	554	111	21.3	24	2664
C. A. I.	649	130	13.9	32	4160
Sub-Total					6,824
GRAND TOTAL					10,994

TABLE XX

SUMMARY OF SPECIAL REQUIREMENTS FOR VISUAL MATERIALS

Medium	Average Items Per Year	Average Length (Minutes)	Number of Graphic Displays Per Item	Number of Graphic Displays Total	Number of Alphanumeric Displays Per Item	Number of Alphanumeric Displays Total
A. Audio-visual programs of less than 10 minutes						
Video Tapes	57	4.25[1]	4	228	2	114
Films	104	5.71[2]	8	832	2	208
Slide Sets	54	5.71[3]	12	648	6	324
Audio Tapes	5	4.33	--	---	--	---
Sub-Totals				1,708		646
B. Audio-visual programs of more than 10 minutes						
Video Tapes	78	28.2[4]	14	1092	4	312
Films	36	19.0[5]	15	540	4	144
Slide Sets	27	22.9[6]	50	1350	20	540
Audio Tapes	18	28.6	--		--	
Slide Tape Sets	24	32.7[7]	48	1152	18	432
Sub-Totals				4,134		1,428
C. Other Media						
P. I.	111	21.3[8]	21	2331	105	11,655
C. A. I.	130	13.9[9]	21	2730	105	13,650
Sub-Totals				5,061		25,305
GRAND TOTALS				10,903		27,379

8. For programmed instruction it is assumed that students use "frames" (visual displays) at an average rate of 3 per minute and that the redundancy factor for programs is 2. (That is, there are twice as many frames as any one student would normally use.) About 83% of the frames are assumed to be alphanumeric.

9. The "visual" requirements for C. A. I. are difficult to estimate because there is little documentation in the literature covering actual experiences in the production of C. A. I. programs for a truly operational system. Assuming the existence of a reasonably efficient computer language for this application, the same 3 frame per minute guideline suggested above for P. I. may be used, but a redundancy factor of 3 is allowed to take advantage of the rich interaction provided by the computer. As above, 83% of the displays are assumed to be alphanumeric in character.

If we assume that "graphic arts" visuals (consisting of photographs or art-work) require an average of 30 minutes to prepare, the number of man-hours per year for this type of visual preparation is found to be 10,903/2 = 5,452. Assuming a 2,000 hour work year (50 weeks @ 40 hrs./wk.) the number of illustrator/photographers required is 5,452/2,000 = 2.73. If we assume that keyboard-compared alphanumeric displays require an average of 10 minutes to prepare, the man-hours per year for this type of visual preparation are found to be 27,379/6 = 4,563. Again assuming a 2,000 hour work year, the number of typed-composers required is 4,563/2,000 = 2.28.

Studio time requirements for both video tape and film production are presented in Table XXII. Estimates concerning studio time requirements per item for both short (10 minutes or less) and long (more than 10 minutes) video tapes and films are identified. These are extended to present total studio time required per year. A total of 1,101.5 hours annually will be required which represents approximately 55% load for a single TV film studio available for a 2,000 hour work year.

Annual Cost of Media Production. In estimating the cost of media production it is assumed the materials will have a five-year useful life span. With these assumptions the annual cost of media production fitted to the needs of WETEP are shown in Table XXI.

TABLE XXI

ESTIMATED AVERAGE ANNUAL COST OF MEDIA PRODUCTION PERSONNEL

5.7 Faculty members (in media production @$20,000)	$114,000
2.7 Illustrator/Photographer @$10,000	27,000
2.3 Typist-Illustrators @$7,000	15,100
1 Producer-Director @$18,000	18,000
2 Production Coordinator @$12,000	12,000
Secretarial and Clerical Support (part of which may be student hourly help)	20,000
2 Computer programmers for media-related assignments @$15,000	30,000
Sub-total, Staff Salaries	$236,100

TABLE XXII

ESTIMATES OF STUDIO TIME REQUIREMENTS FOR VIDEO TAPE AND FILM PRODUCTION

Medium	Items Per Year	Average Length (Minutes	Estimated Studio Time Per Item (Hours)	Total Studio Time (Hours)
Short Video Tapes	57	4.25	1.5	85.5
Short Films	104	5.71	4.0	416
Long Video Tapes	78	28.2	4.0	312
Long Films	36	19.0	8.0	288
	Total			1101.5

Although the costs in Table XXI represent average annual costs, the actual allocation of these costs to each year of the development period was based upon the per cent of module development for each year.

The details of studio related expenses are set forth in Table XXIII. In review of this table it is to be noted that it is anticipated that WETEP will utilize this facility to the extent of 55 per cent of its total use. It is expected that the balance will be utilized by other departments within the University.

TABLE XXIII

STUDIO-RELATED ANNUAL EXPENSES

4 Cameramen/Production Assistants @$8,000	$ 32,000	
2 Electronic Technician @$12,000	24,000	
2 Film Operators/Photo Technician @$12,000	24,000	
1 Studio Supervisor @$15,000	15,000	
Sub-total, Salaries of Studio Personnel		$ 95,000
Studio Equipment Amortization (10 year, Straight-line amortization of assumed investments of $250,000)	25,000	
Studio supplies and maintenance	15,000	
Total Studio Expenses		$135,000
WETEP's share of studio expense (55%)	74,250	
Master Tapes and Film Negatives (per year)	16,000	
Duplicate tapes or films	55,000	
Duplication of other media	40,000	
Total		$185,250

Commercially Produced Media

Throughout the development of WETEP every effort will be made to identify those commercially produced media materials which can be integrated into modules which have been specified and are to be developed by the WETEP staff. Commercially developed materials are defined in this report as those which have been developed outside the WETEP development program. This will include what is typically thought of as commercial productions as well as those productions developed in R & D Centers, laboratories, or other educational agencies. It is difficult at this point in time to estimate the extent to which

appropriate commercial materials can be identified. Wherever possible, however, these materials will be used.

The expected availability of these commercially prepared materials is represented by the data in Table XXIV, and the cost of these commercially produced media are shown in Table XXV. The costs shown in Table XXV represent the total cost for the 5 years of development.

TABLE XXIV

NUMBER OF COMMERCIALLY DEVELOPED MEDIA ITEMS TO BE PURCHASED

Mode	Presentation Time - Length in Minutes							Total
	0-5	6-10	11-15	16-20	21-40	41-60	61-90	
Videotapes	6	9	2	18	34	-	-	69
Films	6	8	8	48	178	22	2	272
Slide Sets	6	4	8	-	12	7	-	37
Audiotapes	6	-	3	-	10	7		26
Slide/Tape	-	-	-	-	17	1	-	18
P. I.	-	-	12	-	2	9	3	26
C. A. I.	-	-	6	-	17	2	-	25

TABLE XXV

ESTIMATED COST OF COMMERCIALLY PRODUCED MEDIA FOR FIVE YEARS OF DEVELOPMENT*

Video Tapes Sub-Masters 69 x 1 x $220 = 15,150	
Duplicates 69 x 10 x $150 = 103,000	$118,150
Films 272 x 10 x $150	408,000
Slide Sets (or Filmstrips) 37 x 10 x $15	5,550
Audio Tapes 26 x 10 x $10	2,600
Slide/Tape Sets 18 x 10 x $20	3,600
Programmed Instruction 26 x 10** x $20	5,400
CAI Programs 25 x $400***	10,000
Grand Total	$553,300

* Assuming 10 copies are needed for each A-V item.

** Need for 10 copies not analyzed in detail.

*** An educated guess--little precedent available for this price.

Capital Equipment

The preliminary specification for the technological systems required to support the instructional aspects of WETEP are presented in Volume V of this report.[6] The analysis of media requirements for operation indicates a need for forty-two student stations for sound motion pictures and an additional twenty-eight student stations for individual viewing of still pictures and the use of other audio-visual materials. This supports a total of seventy student carrels, the cost of which varies with the degree of sophistication or elaborateness of the equipment provided. The cost estimates for seventy stations varies from a low figure of $25,400 to a maximum of $21,062,000. Various intermediate estimates were $1,507,700, $448,000 and $396,400.[7]

One approach to the media system (priced at $1,507,700) has been integrated with a more comprehensive system that also meets the needs of groups of students, faculty and administrative personnel for access to audio-visual materials and the WETEP information systems. Estimated costs for the integrated system are summarized in Table XXVI.

The cost of this equipment is exclusive of the cost of communication equipment ($494,000) which is properly chargeable to the telecommunication operation which is explained in the Technological Facilities Report.[8]

The data in Table XXVII summarizes the cost of media development exclusive of the tele-communications system. The data are estimated from an annual cost to show 5 year development costs and for the first year of WETEP operation. One item not previously identified in the three parts of this section is the cost of duplication of media which is represented in Table XXVII in an amount of $40,000 per year.

---

[6] Sullivan, et al., op. cit.

[7] Ibid, pp. 349-355.

[8] Ibid, pp. 361-362.

TABLE XXVI

ESTIMATED COSTS FOR CAPITAL EQUIPMENT RELATED TO MEDIA

Terminal Equipment	
197 "Universal" terminals @$960	$189,120
6 Non-Impact Printers @$6000	36,000
Sub-Total, Terminal Equipment	$225,120
Computer Interface Equipment	
48 Digital-to-Video Converters (Display Control Units) @$6500	$312,000
Audio-Visual Lesson-Source: Equipment	
96 Video Tape Machines @$4700	$451,200
9 Color TV Film Chains @$7500	
37 Color TV Slide Chains @$7500	277,500
24 Audio Cartridge Tape Decks @$500	12,000
Sub-Total, A-V Equipment	$808,200
Switching Equipment	
102 x 160 Audio-Video Switching System	$1,224,000
99 x 94 Video-Audio-Data Switching System	698,000
44 x 36 Video-Audio-Data Switching System	119,000
54 x 20 Video-Audio-Data Switching System	81,000
Sub-Total, Switching Equipment	$2,122,000
Total	$3,467,320

Assuming a ten-year depreciation period the annual cost would be $346,732 with a cost of $2,188,392 for the six year period. This includes five years of development and one year of use in an implemented WETEP.

TABLE XXVII

COST OF MEDIA IN ACTUAL DOLLARS--ANNUALLY AND FOR DEVELOPMENT AND OPERATION

Item	Average Annual Cost	Five-Year Development Cost	One Year of WETEP Operation	Total Development and Operation (6 years)
Media Development				
Media Production	$236,100	$1,180,500	$236,100	$1,416,600
Studio Related Expenses	185,250	926,250	185,250	1,111,500
Commercially Produced Media	110,660	553,300	110,660	663,960
Capital Equipment	364,732	1,823,660	364,732	2,188,392
TOTAL	$896,742	$4,483,710	$896,742	$5,380,452

In apportioning the total five year media development cost to each year of the development phase, the schedule of module development was used. Therefore, in 1970-71 when 2% of the modules are developed, 2% of the total media development cost will be incurred. Table XXVIII shows the apportionment of media development costs by this procedure.

TABLE XXVIII

TOTAL COST OF MEDIA COMPONENT DURING DEVELOPMENT PERIOD

Year	Per Cent of Development	Media Development Cost
1970-71	2.0	$ 89,674
1971-72	20.7	928,128
1972-73	39.8	1,784,517
1973-74	36.7	1,647,521
1974-75	.8	35,870
TOTAL	100.0	$4,483,710

In addition to the media already described above, a tele-communication system or comparable system linking WETEP with the ten cooperating schools and three mobile vans will be purchased during the development period. The calculations used here are tied to tele-communications but are subject to modifications at a later date. There will be a micro-wave transmission and receiving set costing $38,000 in each of the ten schools and in each of the three mobile vans. Each of the three mobile vans is estimated to cost $14,000. The schedule for the purchase of this equipment is as follows:

TABLE XXIX

COST OF TELE-COMMUNICATIONS EQUIPMENT

Year	Equipment Purchase	Cost
1972-73	1 micro-wave set	$ 38,000
1973-74	3 micro-wave sets and 1 mobile van	128,000
1974-75	9 micro-wave sets and 2 mobile vans	370,000
TOTAL	13 micro-wave sets 3 mobile vans	$536,000

When the cost of this tele-communication system is added to the cost of media for the development phase, the following totals result:

TABLE XXX

TOTAL COST OF MEDIA PLUS TELE-COMMUNICATIONS DURING DEVELOPMENT PERIOD

Year	Total Cost
1970-71	$ 89,674
1971-72	928,128
1972-73	1,822,517
1973-74	1,773,521
1974-75	405,870
TOTAL	$5,019,710

Pricing Additional WETEP Support Systems

Since each support system is described fully in Volume V, the identification of costs is the only concern here. With few exceptions the procedure used in determining the costs for these functions is the same as used in the module development. Seven cost categories were identified for each of the support systems.

- Faculty salaries
- Secretarial salaries
- Research assistants' salaries
- Supplies
- Capital Equipment
- Office space
- Consultants' fee and expenses

With the exception of situations described below, when these categories appear they were calculated in the manner described earlier in this paper. It should be noted also that all salaries were calculated on the basis of eleven months.

Exceptions to the above procedure occur with the director of the management system and the coordinator of the faculty in-service component. The salaries for both of these positions are based upon the projection of the average salary of a full professor at the University of Wisconsin, School of Education. In addition, because it was anticipated that consultants for the management system would be more costly than instructional consultants, $400 per day was budgeted for their fees and expenses rather than $250. Because the Research Center will have somewhat unique resource demands, a separate account for technical support was budgeted. Expenditures from this account will include data processing costs and other costs associated with the research effort. These constitute the only significant departures from the costing procedures which have been followed throughout this report.

Tables XXXI through XXXV present the anticipated costs of each of the five WETEP support systems during the development period. It should be pointed out that many of the personnel requirements for these components were expressed in part-time terms. Therefore, if the figures which appear at some places on the following tables may seem unusually small it represents a position filled on only a part-time basis. The costs for each of these components were also calculated in constant 1968-69 dollars and these figures are summarized as part of Table XXXVII.

Summary of All WETEP Development Costs

Tables XXXVI and XXXVII consolidate all costs allocated to the development phase of WETEP. The distribution of actual dollars costs of $23,936,694 are reported in Table XXXVI. The same distribution of constant 1968-69 dollar costs of $18,429,038 are reported in Table XXXVII.

TABLE XXXI

DEVELOPMENT OF FACULTY IN-SERVICE IN ACTUAL DOLLARS

	1970-71	1971-72	1972-73	1973-74	1974-75	Total
Coordinator Salary	12,238	12,984	17,632	27,759	43,705	114,318
Faculty Salaries	48,179	64,291	84,867	134,744	213,588	545,669
Research Assistants	1,188	1,266	1,673	2,647	4,233	11,007
Secretarial Salaries	2,400	2,516	3,297	5,253	8,261	21,727
Consultants	20,000	21,252	28,228	44,992	71,714	186,186
Supplies	10,584	13,385	17,745	28,138	44,546	114,398
Capital Equipment	1,162	1,469	1,948	3,088	4,889	12,556
Office Space	2,458	2,585	4,576	7,230	11,430	28,279
Total	98,209	119,748	159,966	253,851	402,366	1,034,140

TABLE XXXII

FUTURE-PLANNING UNIT DEVELOPMENT COSTS IN ACTUAL DOLLARS

	1970-71	1971-72	1972-73	1973-74	1974-75	Total
Faculty Salaries	43,617	46,091	48,705	51,467	54,385	244,265
Research Assistants	9,012	9,458	9,898	10,360	10,843	49,571
Secretarial Salaries	12,002	12,584	13,190	13,826	14,496	66,098
Supplies	11,036	11,632	12,254	12,910	13,602	61,434
Capital Equipment	1,211	1,277	1,345	1,418	1,493	6,744
Office Space	4,184	4,401	4,631	4,876	5,135	23,227
Total	81,062	85,443	90,023	94,857	99,954	451,339

TABLE XXXIII

MANAGEMENT SYSTEM DEVELOPMENT IN ACTUAL DOLLARS

	1970-71	1971-72	1972-73	1973-74	1974-75	Total
Director	24,484	25,973	27,552	29,226	31,004	138,239
Consultants	12,000	8,000	8,000	4,000	4,000	36,000
Research Assistants	15,544	16,752	17,668	18,836	20,080	88,700
Secretarial Salaries	6,001	6,292	6,595	6,913	7,248	33,049
Office Space	3,002	3,157	3,323	3,498	3,684	16,664
Supplies	7,549	8,039	8,498	9,016	9,566	42,668
Capital Equipment	829	882	933	990	1,050	4,684
Total	69,409	68,915	72,569	72,479	76,632	360,004

TABLE XXXIV

RESEARCH CENTER DEVELOPMENT COST IN ACTUAL DOLLARS

	1970-71	1971-72	1972-73	1973-74	1974-75	Total
Faculty Salary	56,159	158,254	167,228	176,711	186,731	745,083
Research Assistants	21,688	45,400	47,511	49,726	52,043	216,368
Secretarial Salaries	6,001	18,876	19,875	20,739	21,744	87,235
Supplies	10,000	20,000	21,252	22,582	23,996	97,830
Technical Support	10,000	20,000	21,252	22,582	23,996	97,830
Consultants	4,000	8,000	8,501	9,033	9,598	39,132
Office Space	5,253	13,419	14,123	14,868	15,659	63,322
Total	113,101	283,949	299,742	316,241	333,767	1,346,800

TABLE XXXV

SUMMARY OF ALL DEVELOPMENT COSTS IN ACTUAL DOLLARS

MODULE DEVELOPMENT AND SUPPORT SYSTEMS	1970-71	1971-72	1972-73	1973-74	1974-75	TOTAL
Module Development	765,697	2,249,220	3,723,449	3,310,382	1,207,185	11,255,933
Computer Component	137,000	627,630	805,186	829,121	829,586	3,228,523
Media and Tele-Communications	89,674	928,128	1,822,517	1,773,521	405,870	5,019,710
Assessment	185,258	264,319	284,640	256,013	250,015	1,240,245
Faculty In-Service	98,209	119,748	159,966	253,851	402,366	1,034,140
Future Planning	81,062	85,443	90,023	94,857	99,954	451,339
Management System	69,409	68,915	72,569	72,479	76,632	360,004
Research	113,101	283,949	299,742	316,241	333,767	1,346,800
Total	1,539,410	4,627,352	7,258,092	6,906,465	3,605,375	23,936,694
Per Cent of Total	6.4	19.3	30.3	28.9	15.1	100.0

TABLE XXXVI

SUMMARY OF ALL COSTS FOR DEVELOPMENT PHASE IN CONSTANT 1968-69 DOLLARS

MODULE DEVELOPMENT AND SUPPORT SYSTEMS	1970-71	1971-72	1972-73	1973-74	1974-75	TOTAL
Module Development	573,022	1,496,372	2,262,581	1,829,439	595,720	6,757,134
Computer Component	137,000	627,630	805,186	829,121	829,586	3,228,523
Media and Tele-Communications	89,674	928,128	1,822,517	1,773,521	405,870	5,019,710
Assessment	143,106	194,259	198,979	173,401	152,032	861,777
Faculty In-Service	79,566	79,566	125,326	188,256	282,388	755,102
Future Planning	86,008	86,008	86,008	86,008	86,008	430,040
Management System	63,849	60,849	60,849	57,849	57,849	301,245
Research	101,287	243,555	243,555	243,555	243,555	1,075,507
Total	1,273,512	3,716,367	5,605,001	5,181,150	2,653,008	18,429,038
Per Cent of Total	6.9	20.2	30.4	28.1	14.4	100.0

PRICING OF WETEP OPERATION ON THE MADISON CAMPUS

LeRoy Peterson
Steven M. Koch

88/89

Introduction

In establishing a pricing system for WETEP operation, it was determined that the WETEP program could not properly be defined by the systems of budgeting, educational and financial accounting procedures presently in use in higher education. WETEP financial and educational accounting is designed to provide answers to continuing questions about the relationship between expenditures in education and benefits in learning. How much do individual elements or segments of the program contribute to the educational return? How much learning has resulted from specific approaches? What alternatives to differing resource allocations are likely to produce greater educational and economic returns? Planning, programming and budgeting systems for providing accountability for the allocation and utilization of resources are used in the pricing of WETEP. The use of PPBS will facilitate the continued improvement of accounting systems and the application of cost-benefit techniques throughout the 1970-75 developmental period and in later operations.

This paper describes the pricing of WETEP operation on the Madison campus. Details of cost are given for all program elements and support systems. This description is followed by a brief discussion of the transferability of WETEP to alternative campuses.

Pricing of WETEP on the Madison Campus

During the development phase three major interrelated but distinct functions are being pursued simultaneously. In pricing the WETEP program in actual operation, understanding of this interrelatedness is crucial. These functions are described below:

1. The present undergraduate program of preparation for elementary teachers will continue as described in "Pricing the Present Program." This program will be gradually phased out as WETEP modules become ready for implementation.

2. Development of the WETEP program is described in "Pricing WETEP Development." This program, conducted over a five year period, is to be directed to production of materials, to development of learning activities, and to the reorganization of management procedures which will be developed and tested in the operational WETEP program. This activity includes pilot application and analysis accompanied by adjustments and refinements, moving toward full implementation of WETEP in 1975-76.

3. WETEP program operation each year after the first year of development, assumes responsibility for an increasing percentage of the total program for preparation of elementary teachers. WETEP's instructional program is implemented gradually over five years. The extent of change and cost structure are described in the next section of this paper: Operational Costs Concurrent with Developments.

This section of the paper describes the cost of the operational implementation of WETEP in two distinct but interrelated time periods. During the first, the cost of the operation of WETEP is concurrent with development; during the second, the cost is for operation of WETEP at full implementation.

Operational Costs Concurrent with Development

The degree of implementation of WETEP during the development period as well as the degree of continuing operation of the present program is expressed in percentages in Table I.

TABLE I

IMPLEMENTATION OF THE WETEP OPERATIONAL
PROGRAM DURING DEVELOPMENT PERIOD

Year	WETEP Operational Implementation	Present Program Operation
1970-71	0.0	100.0%
1971-72	2.0%	98.0%
1972-73	22.7%	77.3%
1973-74	62.5%	37.5%
1974-75	99.2%	.8%
1975-76	100.0%	0.0

Within this framework WETEP will devote no financial resources to the preparation of elementary teachers in 1970-71. In 1971-72, two per cent of the cost of preparing elementary teachers will result from WETEP operation and the cost of the present program is reduced by two per cent.

To determine year by year operational costs, the financial sources needed for a fully implemented WETEP were first identified. Since only two per cent of WETEP is to be operative in the instructional program in 1971-72, two per cent of the resources required for full implementation were priced. These resources were costed at 1971-72 prices.

The pro rata cost of the instructional program for which WETEP is responsible in years prior to full implementation is shown in Table II.

By 1975-76 the present program will be phased out and WETEP will be fully implemented. Certain support systems under development during the first five years will be phased into the operating program of WETEP in 1975-76.

TABLE II

COST OF FIVE YEARS OF WETEP INSTRUCTIONAL PROGRAM OPERATION

Year	Cost Actual Dollars
1970-71	$ 0
1971-72	59,991
1972-73	830,475
1973-74	2,050,390
1974-75	3,499,311
TOTAL	$6,440,167

The pricing of WETEP necessitated the determination of the cost of all the resources required for a fully implemented WETEP in 1975-76. The first step was to calculate the cost of a fully implemented WETEP at present prices. For this purpose, the cost of the needed resources for 1968-69 (the last year of available data) was calculated. This included such items as salaries of professional staff, research assistants, teaching assistants, secretarial assistance, necessary supplies, capital equipment, office space, and instructional space. To avoid repetitive explanations, information on the several aspects of pricing is provided in the following appendices:[1]

Appendix III:	Salaries of professional staff, post doctorate interns, research assistants, teaching assistants, consultants, and secretarial staff.
Appendix IV:	Cost of supplies and capital equipment.
Appendix V:	Procedures for calculation of square footage of office and instructional space.

---

[1] Data derived from the formulation described in the Appendices are available in a supplementary document in the WETEP Office - School of Education, University of Wisconsin, Madison.

Appendix VI: Calculation of cost for office and instructional space both University owned and leased.

Appendix VII: Explanation of the application of the Cost-of-Education Index.

Appendix VIII: Staff resources required for operation of the WETEP program 1975-76.

Pricing of WETEP Operations 1975-76. Based on present costs with projections to 1975-76, costs of a fully implemented WETEP were calculated. These costs are shown in Table III followed by an explanation of the items included in the total expressed in actual dollar costs. A summary of the resources required to operate the program in 1975-76 is shown in Appendix VIII.

TABLE III

COST OF WETEP FULLY IMPLEMENTED FOR 1975-76

	Actual Dollars
Cost of Administration - Dean's Office	$ 64,695
Cost of Administration - WETEP	86,021
Management System	78,607
Cost of Computer	727,382
Cost of Media	896,742
Cost of Assessment	214,628
Cost of Faculty In-Service	379,813
Cost of Future Planning Center	89,858
Cost of Research Center	306,691
Cost of Elements	2,081,146
Cost of Educational Policy Studies	60,192
TOTAL	$4,985,775

The above items include the cost for the academic year for all items except those for which the cost continues on an annual basis. The yearly cost items are identified as: Cost of Administration - Dean's Office; Cost of Administration - WETEP; Cost of Management System; Cost of Technological Facilities; Cost of Computer; and Cost of Media.

The reason for the substantial cost increase in 1975-76 is that many of these costs in previous years were charged to development. These items include: technological facilities, assessment, faculty in-service, future planning, systems management and research.

While it is not anticipated that WETEP will be fully functioning during the first summer (summer 1976), many of its functions will continue to serve students throughout the summer. It is anticipated that approximately 35 per cent of the WETEP program will be operative in the summer of 1976. The demand for undergraduate elementary teacher preparation at the University of Wisconsin and the potentials for increase in summer school enrollment indicate a generally increased demand for the type of learning experiences which WETEP will provide.

The added cost of the summer session is estimated as an additional 2/9 of the cost of specific items not otherwise functioning beyond the academic year. This amount obviously does not include all disbursements since some previously identified categories of cost are incurred whether or not a summer program is operated. The application of a cost factor of 2/9 to those costs which increase shows the amount necessary for operation of a program for the year, i.e., academic year and summer session. Since the WETEP program is to be only 35 per cent operative during the 1976 summer session, only 35 per cent of these cost increases would be required for the 1976 summer session.[2]

The cost of the items increased by summer school operation, together with the amounts are shown in Table IV.

TABLE IV

COST OF WETEP SUMMER SESSION 1976

Item	Actual Dollars
Assessment	$ 16,677
Faculty In-Service	29,511
Future Planning Center	6,982
Research Center	23,830
Cost of Elements	161,705
Cost of Educational Policy Studies	4,677
TOTAL	$243,382

---

[2] Thirty-five per cent of 2/9 is a factor of 7.7 per cent applied to total costs.

TABLE V

COST OF SUPPORT SYSTEMS (1975-76)

Support System	Director/ Coordinator	Business Manager	Administration/ Faculty	Supplies	Office Space	Capital Equipment	Consultants	Project Assistants	Teaching Assistants	Research Assistants	Technical Support	Secretaries/ Clerical	Total
Dean's Office			64,695										64,695
Administration WETEP	32,889	23,668		9,211	3,882	1,247						15,124	86,021
Management Systems	28,999			9,875	4,219	1,084	4,310	21,970				8,150	78,607
Assessment			107,636	27,486	15,529	3,017	1,000	29,712				30,248	214,628
Faculty In-Service	39,943		182,684	51,027	12,043	5,601	76,202		3,693			8,620	379,813
Future Planning Center			47,029	11,715	5,419	1,286				9,285		15,124	89,858
Research Center			161,472	25,498	16,500		10,199			44,568	25,498	22,956	306,691
Total	101,831	23,668	563,516	134,812	57,592	12,235	91,711	51,682	3,693	53,853	25,498	100,222	1,220,313

TABLE VI

COSTS ASSOCIATED WITH ELEMENT OPERATION

Elements	Instructional Space	Basic					Specialist					In-Service					Grand Total
		Salaries	Capital Equipment	Supplies	Office Space	Total Basic	Salaries	Capital Equipment	Supplies	Office Space	Total Specialist	Salaries	Capital Equipment	Supplies	Office Space	Total In-Service	
Communications	16,580	196,941	3,427	25,307	13,410	239,085	10,108	176	1,299	696	12,279	5,965	104	767	380	7,216	275,160
Mathematics	5,785	99,035	1,723	12,726	6,802	120,286	6,605	115	849	469	8,038	4,780	83	614	275	5,752	139,861
Science	16,580	114,634	1,995	14,730	7,967	139,326	8,209	143	1,055	534	9,941	4,636	81	596	266	5,579	171,426
Social Studies	5,785	100,935	1,756	12,970	6,980	122,641	6,605	115	849	469	8,038	6,394	111	822	396	7,723	144,187
Safety	1,467	7,713	134	991	526	9,364	134	2	17	16	169	2,129	37	274	81	2,521	13,521
Health	3,197	24,652	429	3,168	1,836	30,085	4,782	83	614	291	5,770	2,902	50	373	170	3,495	42,547
Leisure	1,467	7,758	135	997	526	9,416	1,027	18	132	65	1,242	1,239	22	159	65	1,485	13,610
Art	2,162	37,149	646	4,774	2,677	45,246	11,386	198	1,463	744	13,791	11,646	203	1,497	671	14,017	75,216
Music	2,162	30,947	538	3,977	2,240	37,702	9,539	166	1,226	573	11,504	4,796	83	616	283	5,778	57,146
Physical Education	2,162	27,765	483	3,568	2,046	33,862	4,943	86	635	340	6,004	4,919	86	632	291	5,928	47,956
Screening	566	12,367	215	1,589	809	14,980											15,546
Orientation	8,421	55,713	969	7,159	3,720	67,561											75,982
Guidance	2,162	21,278	370	2,734	1,294	25,676	3,450	60	443	485	4,438	1,245	22	160	65	1,492	33,768
Media and Technology	1,644	18,744	326	2,409	1,326	22,805	3,381	59	434	218	4,092	2,402	42	309	146	2,899	31,440
Early Childhood	1,443	12,435	216	1,598	865	15,114	4,812	84	618	283	5,797	3,143	55	404	210	3,812	26,166
Educational Psychology	8,159	60,317	1,046	7,751	4,238	73,352	9,586	149	1,232	647	11,613	2,969	52	302	647	3,970	97,094
Culturally Diverse	1,443	32,927	573	4,231	2,289	40,020	5,987	104	769	421	7,281	5,781	101	742	332	6,956	55,700
Special Education	1,443	15,901	277	2,043	1,173	19,394	8,899	155	1,144	599	10,797	5,121	89	658	307	6,175	37,809
Clinical Experiences	14,687	571,038	9,936	73,378	41,095	695,447	8,796	153	1,130	582	10,662	5,148	90	662	315	6,215	727,011
Total	97,315					1,761,362					131,456					91,013	2,081,146

When the cost of the summer session is added to the academic year cost shown in Table III ($4,985,775) the total is $5,229,157. The cost of the several items of WETEP operation is explained by major categories in the following section.

Cost of WETEP Support Systems. The costs associated with each of the several support systems have been identified and are shown in tabular form, by subsections in Table V.

Cost of Element Operation on the Madison Campus

The operational cost which may be associated with each element is shown in detail in Table VI. The cost associated with elements presented here are exclusive of those costs attributable to the support system shown in Table V. The data for each element shows the cost of the instructional space required, the basic instruction costs, the specialist instruction costs and the cost of in-service instruction. These costs are further divided to include salaries of professors, instructors, post doctorate interns, research and teaching assistants, secretarial assistants, and consultants. Other costs include capital equipment, supplies and office space. These costs are shown for each element in Table VI.

Cost of Operation of Technological Facilities

The technological support systems include computer and media costs. The cost of the computer component in 1975-76 is less than in the previous year. This estimate was based on the fact that current and anticipated innovations in technology indicate that by 1975-76 when WETEP is fully operational, costs for specific technological facilities may be reduced. Anticipated costs of the computer component in 1975-76 are shown in Table XII and those for media are shown in Table VIII.

TABLE VII

COST OF COMPUTER OPERATION IN 1975-76

Data Processing Personnel	Cost of Computer Rental	Computer Mainten-ance	Computer Supplies	Disc Packs	Magnetic Tape	Space	Total
$338,000	$294,132	$54,339	$24,000	$1,650	$500	$14,761	$727,382

TABLE VIII

COST OF MEDIA OPERATION IN 1975-76

Media Production	Studio Related Expenses	Commercially Reproduced Media	Capital Equipment	Duplication of Media	Total
$236,100	$145,250	$110,660	$364,732	$40,000	$896,742

Extension of WETEP to Other Colleges and Universities

One of the tasks undertaken during the feasibility study was that of determining the transferability of WETEP to a variety of other campuses. This task was undertaken in the context of three kinds of campuses: major universities, state colleges, and small liberal arts colleges. The nature of WETEP as an evolving, highly innovative program in higher education made it increasingly apparent that data was insufficient both in quantity and in quality to provide reliable estimates of the feasibility of transferring either all or parts of WETEP to other institutions. Furthermore, the problems of implementing WETEP on the University of Wisconsin campus as well as elsewhere which were identified throughout Phase II analysis appeared to make such estimates premature. That portion of the study was therefore not included in this final report. Interested persons may wish to review and discuss the tentative results of efforts to investigate this important problem with the WETEP staff on the Madison campus of the University of Wisconsin.

Summary

Since students in the WETEP program will also be pursuing work in the Department of Educational Policy Studies, these costs must be added. The total for 1975-76 is estimated at $60,192. This cost is based on the average cost of providing the three credits which elementary teachers take in the Department of Educational Policy Studies.

When all costs for operation of WETEP on the Madison Campus are combined, the total is $4,985,775 for the academic year including annual costs incurred regardless of summer session operation. With $243,382 added for the summer session, the total becomes $5,229,157. The 1968-69 constant dollar amount is $4,492,941.[3]

The per graduate cost of a fully implemented WETEP program in 1975-76 can be determined by dividing the total cost for that year of operation ($4,985,775) by the 300 graduates the program is designed to serve. The result is $16,620. In the projection of costs for the present program for 1975-76, the cost per graduate is $4,892.[4] The ratio between the projected cost of graduates from the new program to that of the old is less than three-and-a-half to one.

---

[3] Constant 1968-69 dollars were arrived at through a determination of the increase in cost of each of the individual items and not by use of a general deflator index.

[4] LeRoy T. Peterson and Thomas J. Flygare, "Pricing the Present Program," Table IV, WETEP Feasibility Study, Vol. VI: Pricing and Economic Analysis, p. 31.

The latter part of this paper reports the cost of operation of a fully implemented WETEP in 1975-76, including both the cost associated with the academic year and the added cost of a summer session. The pricing is organized to permit an estimated cost by individual elements or sub programs within the elements. Costs are presented in this way and in detail so other colleges and universities can gauge the cost of the application of WETEP operations to their own campus either in whole or in selected programs.

PART II

AN ECONOMIC ANALYSIS OF WETEP

This report examines the economics of the Wisconsin Elementary Teacher Education Project in an attempt to illuminate the question of whether WETEP will enhance the objectives of education and society more effectively and more efficiently than some alternative program of educational reform or public investment. The analysis is presented in two parts. The first part explores the cost-effectiveness of WETEP operation and the second part offers a benefit-cost analysis of the entire project.

The first part of the economic analysis examines the formal study of alternative approaches to instructional media and to program staffing which were used to obtain cost-effective estimates for the pricing of WETEP in Phase II. This part of the report also demonstrates the analytic approach required to attain efficiency within WETEP structure and operation.

The second part of the economic analysis develops a benefit-cost analysis of the proposed project on a disaggregative basis. The benefits and costs to society attributable to WETEP are enumerated and partially quantified. The problems involved in obtaining a dependable measure of the impact of WETEP upon the welfare of society are confronted by examining both instrumental and ultimate benefits. Rather than develop a ratio by which to evaluate the project, the benefit-cost analysis systematizes the benefits and costs of the project at several levels of abstraction to facilitate review of the economic efficiency of WETEP.

AN ECONOMIC ANALYSIS
OF THE
WISCONSIN ELEMENTARY TEACHER EDUCATION PROJECT

Mary A. Golladay

102/103

Responsible educational statesmanship requires that any innovation in educational practices be evaluated in terms of its implications for the quality of education generally and for its contribution to the quality of human life. This report examines the economics of the Wisconsin Elementary Teacher Education Project in an attempt to illuminate the question of whether WETEP will enhance the objectives of education and society more effectively or more efficiently than some alternative program of educational reform or public investment. The interdependence of WETEP and the well-being of society is a consequence of the limitedness of public funds and social resources; the implementation of WETEP necessarily implies the contraction of existing public programs or the postponement of other socially valuable projects. It is therefore imperative that the proposal to develop and operate a fundamentally new program of elementary teacher education at the University of Wisconsin be evaluated from an economic perspective as carefully and completely as possible.

The goal of examining whether WETEP is a socially optimal use of scarce public resources may be reduced to two tasks. First, it must be demonstrated that the program objectives of WETEP are achieved by the most effective methods possible. Individual elements must be systematically analyzed in order to assure that the uses being proposed for media, faculty and instructional materials provide the greatest possible educational benefits per unit of public resources committed to the project. This task might be described as the cost-effectiveness phase of the economic evaluation of WETEP. Second, the proposed program must be appraised in competition with other educational and non-educational public expenditures. The objective of such an analysis is to assure that the well-being of society could not be enhanced by transferring resources from WETEP to an alternative public project. The appropriate analytic technique for addressing this issue is benefit-cost analysis; such an analysis evaluates the contribution of a unit of public expenditure to social welfare and hence provides criteria by which to order competing candidates for public funds. Both of these techniques of economic analysis will be briefly described later in the report.

The feasibility studies of WETEP have examined the means by which the goals and objectives of the model teacher education program may be implemented. They have established the resource requirement for developing and operating the program and have explored the extent to which the program imposes particular requirements on university faculty[1], instructional materials[2], instructional management[3] and present technological capabilities.[4] These reports demonstrate that the model teacher education program is feasible and that it generates numerous benefits not provided by current teacher education programs. This information serves as the basis for the present economic evaluation of WETEP.

---

[1] M. Vere DeVault, Mary A. Golladay and Albert H. Yee, "A Systems Analysis Approach to WETEP Management," WETEP, Vol. V, Feasibility Study: Program and Support Systems.

[2] M.Vere DeVault, John M. Kean, Carl R. Personke, and Meredith Rousseau, "WETEP Instructional Program," WETEP, Vol. V.

[3] M.Vere DeVault, Mary A. Golladay and Albert H. Yee, op. cit.

A complete economic analysis of WETEP is beyond the scope of the present study. The resource and time constraints on the evaluation study and the state of educational sciences conspire to limit the analysis to rather general and partial conclusions. Nonetheless, the present analysis serves two very important functions. First, it underscores the importance of the economic dimension of the project and hence shapes the technical specifications of the project. The use of cost-effectiveness analysis on a pilot basis in studying the resource needs of the program has produced a consciousness among the professional educators involved in the project of the need to design cost-effective techniques for approaching program objectives. While much of this analysis has been informal, it has contributed substantially to the process of designing a technically efficient, individualized instructional program. Second, the economic analysis, although only partially formalized and quantified, provides the public policy maker with vastly improved insights into the economic efficiency of the program. The economic analysis identifies the relationships between program objectives and resource requirements and quantifies some of the major costs and benefits of WETEP, thereby substantially reducing the role of impressionistic and purely intuitive judgments in decisions regarding the proposed project.

The report is presented in three parts. The first part discusses the role of cost-effectiveness in the feasibility study and in the development and sustained operation of WETEP. Two illustrative examples are discussed. The second part presents a benefit-cost analysis of WETEP. The techniques of benefit-cost analysis and their rationale are discussed and then applied to WETEP. The last part offers a brief summary and conclusions.

---

[4] Charles Sullivan, _et_. _al_., "An Analysis of Technological Facilities Required for WETEP," _WETEP_, _Vol_. _V_. _Feasilibility Study: Program and Support Systems_.

Cost-Effectiveness Analysis Within WETEP

The first task in the economic analysis of WETEP is to assure that program objectives are satisfied in the most efficient manner possible. The analytic technique of cost-effectiveness analysis has been employed on an informal pilot study basis in the Phase II development of element specifications. The best methods for delivering the media requirements and of staffing WETEP have been examined at considerable length in Phase II. In this part of the economic analysis these two examples of cost-effectiveness analysis are reviewed and their implications for the development of specifications are underscored.

Cost-effectiveness is a general term applied to a collection of techniques to evaluate methods of carrying out a prescribed function. The application of cost-effectiveness analysis requires a systems approach to the problem of selecting optimal alternatives.[5] The steps require that one (1) formulate the problem; (2) set objectives; (3) determine environmental criteria; (4) recognize resources and constraints; (5) develop alternatives; (6) evaluate alternatives; and (7) make a decision. The term cost-effectiveness suggests a particular emphasis on the specification of objectives, in terms of effectiveness; on the alternatives explored, in terms of their cost; and on the methods used in evaluating the alternatives, in the form of optimization techniques.

Cost-effectiveness analysis forces explicit consideration of the economic effects of resource allocation but does not dictate solutions. The cost-effectiveness problem may be concisely stated in either of the following forms; (1) given a required performance and schedule, minimize dollar cost as weighted by time; or (2) given a time-weighted cost, maximize performance.[6]

The quality of conclusions which result from the application of cost-effectiveness techniques is dependent upon the quality of each step in the analysis. Apparent objectives may differ from true objectives. Initially specified alternatives may ignore creative, optimal choices. Costing may neglect significant dimensions of the financial consequences accompanying each alternative.

---

[5] M. Vere DeVault, Mary A. Golladay, and Albert H. Yee, "A Systems Analysis Approach to WETEP Management," WETEP, Vol. V, Feasibility Study: Program and Support Systems.

[6] J. Morley English, Cost Effectiveness: The Economic Evaluation of Engineered Systems. New York: John Wiley and Sons, Inc., 1968, p. 5.

WETEP is committed to the use of cost-effectiveness and cost-benefit analyses as one dimension of the evaluative activities which will be carried on throughout the development, implementation, and operational phases of the project. Cost-effectiveness analysis has had a significant impact on the operational characteristics of the instructional program during Phase II; thus the pricing figures presented in the cost analysis are in a sense 'cost-effective' estimates as opposed to idealistic estimates. This section reviews briefly the cost-effectivenss analyses of one aspect of media selection and of the determination of personnel requirements. Both the examples chosen and the discussion of them are meant to be illustrative of the commitment of the project to the incorporation of the techniques and the effect which that commitment has already had upon the project specifications.

A Cost-Effectiveness Analysis of Selection of Media for Presentation of Sound Motion Pictures

This section describes the application of cost-effectiveness techniques to the choice of media for the presentation of sound motion pictures. A complete presentation of the analysis described here is contained elsewhere in this Phase II report;[7] this discussion is limited to an examination of the appropriateness and usefulness of the technique.

Sound motion pictures are used frequently as instructional modes in the WETEP program. Because they account for a sizeable proportion of instructional time and the commitment of extensive financial resources, the choice of optimal methods of presentation of motion pictures should reflect cost-effective analyses. The choice of methods for motion picture presentations is a problem well suited to the application of cost-effectiveness analysis. The problem is narrowly enough defined to make an exhaustive analysis both feasible and interesting. Furthermore, technical data relating to alternatives are avilable.

The first step in the cost-effectiveness analysis of methods of presenting sound motion pictures was the precise formulation of the problem. Summary tables provided numbers of required films, their estimated times, and the extent of student access to the films. This problem formulation suggests immediately that numbers of film copies, storage space and durability factors must be evaluated for each alternative identified.

---

[7] Charles D. Sullivan, et. al., "An Analysis of Technological Facilities Requirements for WETEP," WETEP, Vol. V, Feasibility Study: Program and Support Systems.

Technological capabilities, both current and projected, provided the list of viable alternative presentation methods. The available alternatives were grouped into two general classes: those yielding optical images (such as 8 mm film cartridges) and those yielding TV signals (such as video tapes). Identification of those two classes of available presentation methods suggests that the extent of student use will be a significant factor in the choice of method, because of the wide variations in the cost of the basic playback units. For example, methods yielding optical images may have comparatively high cost ($53.99 for an 18 minute 16 mm color film), while the cost of playback units are comparatively low ($500). A film of the same length on color video tape costs only $21.30, but the playback unit costs $4700.

Environmental criteria which enter the analysis are considerations of (1) storage space requirements; (2) logistical problems involved in distributing program materials; (3) probable student waiting times; (4) ease of operation, particularly if methods involve student operation; (5) maintenance problems; and (6) acoustical noise in playback equipment.

Three alternatives were selected for illustrative pricing: technicolor film cartridges, video tapes on separate reels and video tapes on shared reels. With the assumption that playback equipment has a life of ten years for each alternative, and that the program life of content material is five years, total costs for presenting the three illustrative alternatives over ten years were, in order, $699,040, $595,686, and $486,294.

The total costs over a ten year period were considered in relation to the environmental factors mentioned earlier. Technicolor films, while least expensive, require considerably more (up to ten times) storage space than video tapes and pose problems for student access. Differences in quality of the visual image also contributes to the desirability of Technicolor presentations. While no final conclusions were reached at this stage in project development, a combination of video tapes on shared reels and Technicolor cartridges appeared to offer the most cost-effective approaches.

Aside from its economic value in demonstrating that choices could result in differences of up to $200,000 in expenses over ten years, the cost effectiveness analysis of the method of presenting motion pictures has resulted in the identification of environmental factors which should be considered in all instructional decisions. The cost-effectiveness analysis also has forced re-evaluation of the relative desirabilities of particular presentation methods in instruction, such as video tapes of microteaching, and their implications for media production, either local or commercial.

A Cost-Effectiveness Analysis of Instructional Staff Requirements

A major problem in the formulation of an efficient model teacher education program is the optimal use of personnel in instructional activities. The specification of objectives and the determination of environmental criteria for this problem represent more fundamental aspects of the cost-effectiveness analysis than they did in the preceding example.

WETEP instructional staff will not act as the primary means of information transmission but as a means of relating instructional experiences to a student's personal experiences and professional objectives. Thus the functions to be performed by instructional staff cannot be fulfilled by media or some alternative means. The objectives for the use of instructional staff thus considerably constrain alternatives. An environmental criterion which further constrains the alternatives for the WETEP instructional staff is the importance of a personalized environment for learning.

The alternatives for meeting instructional staff requirements are not defined at the discrete level characteristic of alternatives for media presentations. Therefore three dimensions of staffing which encompass the range of feasible alternatives have been identified: (1) variations in the amount of faculty-student interaction in conferences and seminars; (2) variations in the size of seminars; and (3) differentiated staffing patterns. These three dimensions together offer a continuum presenting possible choices. WETEP objectives and criteria influence the relative desirabilities of choices reflected by the three dimensions. The importance of a personalized environment for WETEP limits the range of feasible options offered by dimension one. Pedagogical factors constrain dimension two; seminars of from 8 to 12 students were considered feasible by the WETEP faculty, while seminars of 15 were believed to be much less effective. Dimension three offered the most promising means of achieving economical operation without sacrificing effectiveness.

Three illustrative personnel configurations obtained by examining the three dimensions of staffing are presented here. The amount of student time in conference with faculty members was not changed; variations in dimension one were achieved by varying faculty contact time with students by 20 per cent. Increases in numbers of students in seminars by 20 per cent were allowed as the maximum change in dimension two. Changes in dimension three were limited to replacing approximately 40 per cent of the instructional staff of faculty rank with teaching assistants.

The applications of these three changes in dimensions to specifications of annual instructional costs suggests ways of achieving considerable economies in program operation. The combination of alternatives producing the highest costs of instructional staff yields an annual cost of $2,270,266. Adding assistants in place of forty per cent of faculty reduces the annual cost to $1,277,150, a reduction of approximately 44 per cent. Increasing the student contact time of professors by 20 per cent provides an 8.5 per cent decrease from the already reduced amount, to $1,168,490. A 3.6 per cent decrease can be obtained by increasing the size of seminars 20 per cent, resulting in annual costs of $1,231,170. Application of the two reductions simultaneously cuts operating costs by $1,122,510.

Casual empiricism and the intuitive judgments of the WETEP staff suggest that although the staffing pattern with a cost of $1,122,510 produces a less desirable level of teacher education, the reduction in effectiveness is not as great as the decline in costs. The latter pattern is therefore employed in the pricing of WETEP operation.

Summary

This section has presented cost-effectiveness analyses of media and of staffing for WETEP. The purpose of these analyses in Phase II has been to assure that project objectives are being fulfilled at the least possible cost. In addition these studies have served as a model of cost-effectiveness analysis thereby imparting a concern for the internal efficiency of the model project. This concern is manifest in the specifications of resource requirements for each of the program elements and supporting activities.

A Benefit-Cost Analysis of WETEP

The second major task in the economic analysis of WETEP is to examine whether the commitment of public resources to the project is socially optimal. This part presents a benefit-cost analysis of WETEP which attempts to assess the social productivity of resources committed to the project. The goal of the analysis is to generate insights into the increases in social welfare that will result from WETEP.

The analytic technique of benefit-cost analysis is designed to provide a criterion for selecting public investments from a group of competing projects. The underlying principle is that if the ratio of total value of future benefits to the value of project costs exceeds one, the welfare of society could be increased by implementing the proposal. The operational significance of the criterion flows from a rather involved theory of economic institutions and behavior. For present purposes it is sufficient to note the conclusions of that theory: that the cost estimate portrays the loss in social welfare resulting from withdrawing resources from alternative uses, and similarly, that the benefit estimate summarizes the gain in welfare or utility that may be obtained through project implementation. These conclusions depend rather crucially on the implication of economic theory that observed market prices are very good metric approximations of the relative utility-value of different commodities or services; individuals within the economy are assumed to reveal their preferences, tastes and values through their decisions to purchase and consume particular goods. The benefit-cost ratio therefore is not to be interpreted as the ratio of two money values but rather as the ratio of two public welfare or utility measures.

Benefit-cost analysis is most successful in situations in which the social utility of a project may be easily inferred from the price paid either directly or indirectly for the product of the project. The early work in water resource development project evaluation illustrates the principle very neatly. While a hydroelectric dam is not marketable directly to the public, the benefits of the dam enter immediately into products or services which are purchased and consumed by individuals. The utility significance of a dam may therefore be inferred from the preferences revealed by individuals for the consumable services provided indirectly by the dam. The social value of flood control, irrigation and reclamation, and electrical power is revealed by the higher prices people are willing to pay for more secure home sites or by the increased cash value of food production or aluminum refining.

Evaluation of a teacher-education program is particularly difficult because the chain of events between teacher preparation and the ultimate enhancement of personal and community well-being is very extended and complex. The ultimate value of education may be analyzed as three components: 1) education is intrinsically and immediately valuable; 2) education provides skills and perspectives which increase the ability of the individual to enjoy life and to contribute to community welfare; and finally 3) education produces skills which enhance the economic productivity and hence increase the consumption of the individual and his family. Teacher education presumably increases the skills of teachers and hence improves their effectiveness. More effective teachers and schools increase the quality of education thereby enhancing the value of the ultimate goals of education. The study of elementary schools is further complicated by the fact that elementary education is in many respects instrumental in preparing persons for more advanced educational experiences.

In the present analysis the dangers of over-emphasizing measurable benefits and of ignoring more elusive ones are particularly serious. The present study attaches measures to benefits and cost where possible; however the reader should be cautioned that measured benefits are in no sense superior to unmeasured benefits. This study does not present an estimated benefit-cost ratio. The incompleteness of the enumeration of benefits, the uncertainty and diffuse nature of future costs and returns and the primitive nature of supporting research precludes the sort of precision implied by a benefit-cost ratio.

The conspicuous value of WETEP to other levels of education and to educational theory and research further suggests that a benefit-cost analysis based exclusively on the elementary teacher education program will seriously understate the benefits of the project. While the instructional program is addressed specifically to the preparation of elementary school teachers, the insights and the formal research generated by the program, both during its development and its operating phases, will substantially benefit education generally. The project may be expected to influence instructional methods at all levels of education; this research and development function is appropriately viewed as an important source of project benefits. In addition the project permits and encompasses important areas of educational research such as media effectiveness. The economic analysis of WETEP must therefore include an examination of the more general benefits of the project.

Another problem in the economic analysis of WETEP results from the dynamic environment of education and modern life. The appropriate values to attach to program or project benefits and costs depend crucially on the course of future events. Several impressionistic statements can be made about future demands upon education: it is apparent that problem solving skills, value formation and personal discipline are likely to become more important as technology assumes routine tasks. The cost of mediated instruction relative to instruction by teachers is likely to decline in the future. Only when these issues and others like them are successfully addressed will it be possible to evaluate completely the cost and benefit streams associated with WETEP.

Because of the obvious and insurmountable problems involved in a formal benefit-cost analysis of WETEP, the following evaluative strategy has been developed. Three levels of project benefits have been identified and assessed. The implications of WETEP have been examined at the levels of teacher preparation, elementary education and ultimate individual and social welfare. In addition, the benefits of the total program including the research and development components have been examined. This discussion identifies the expected impact of WETEP on educational practices and research generally and thereby on social welfare.

The benefit-cost analysis is presented in three sections. The first section examines the expected benefits to be derived from WETEP. Both measureable and nonmeasureable benefits are presented at three levels of abstraction. The second section presents costs, both development and operating, which are associated with each aspect of WETEP. The costs are summarized from more extended cost analyses performed as part of the feasibility study; they are presented here in order to provide an empirical basis for the economic analysis. The third section examines the benefits of WETEP in relation to costs.

Benefit Analysis

The purpose of this section is to articulate the benefits of WETEP in a manner comprehensible to a variety of audiences and in a fashion which will permit their comparison with program costs. The section reflects an attempt to meet the requirement of benefit specifications and, where possible devaluation. Program objectives and goals[7] are cited to improve the reader's understanding of the program and hence the framework within which the benefit analysis is conducted.

---

[7] WETEP staff, WETEP, Vol. I, Position Papers, 1969.

WETEP will offer benefits to many groups of persons. The various populations receiving benefits will be identified in the discussions of explicit benefits throughout this section of the report. In comparing benefits and costs, however, this analysis will adopt the point of view customary in benefit-cost analyses - all benefits will be considered as though they accrued to the same group which is bearing the cost of the program.

WETEP goals and benefits will be considered at the three levels of teacher preparation, elementary education and social welfare. The first two levels of benefit abstraction are instrumental in increasing social welfare. They are incorporated in the analysis in order to portray more completely the expected benefits of WETEP. If the literature of educational research were sufficiently developed to support statements regarding the quantitative impact of changes in teacher preparation on ultimate social welfare, these discussions would be unnecessary. However, the relationships between teacher preparation or elementary education and social welfare are not well defined; this report postulates some of these relationships but the more elusive ones are merely suggested. A review of these three levels of benefits permits the reader to construct an impressionist view of the dimensions and magnitudes of WETEP benefits and thereby to evaluate more accurately the value of the proposed program.

Benefits of WETEP to Teacher Preparation. WETEP is premised on the view that university education can be humanized and rationalized through mediated, individualized instruction. The value of the WETEP program to future teachers appears particularly important in that it will serve as a continually evolving model of best educational practices. WETEP is designed to provide highly personalized presentations of instructional materials within individually designed programs of study. Simultaneously, the design of WETEP acknowledges the need for humanization of higher eduction, not simply through the elimination of large, impersonal lecture classes, but through a fundamental change in the nature of faculty-student contacts. Faculty are freed from the task of transmission of instructional material in order to permit them to relate material which has already been presented and learned, to the particular professional goals and aspirations and background of the student. Technology is viewed as a tool which facilitates both the individualization of instruction and the improvement of the nature of faculty-student relationships. In planning for the implementation of these premises, the necessity of basing a program on sound pedagogical principles should be paramount, not only for the sake of the students who are engaged in the program, but as a modeling device which effectively demonstrates for the prospective teacher the potentialities of individualized education in realizing the goals of education.

This portion of the benefit analysis investigates the impact of WETEP on the quality of elementary school teacher preparation. In later parts of the analysis, these effects will be traced through their implications for the quality of elementary education and for ultimate individual and community welfare. Topics are considered in the following sequence: (1) the instructional program, (2) media, (3) the management system, (4) screening activities, (5) the assessment program, and (6) the systems or ecological perspective.

Instructional Program. WETEP is composed of a set of nineteen instructional elements within four components which are responsible for the major content areas of the teacher education curriculum and of supporting activities. The WETEP components and elements are shown in Figure 1. This discussion investigates the benefits to be obtained from the instructional program. The opportunities afforded by the WETEP proposal to structure and define curricula permit the more rational and efficient use of student time and university facilities, and in addition allow the introduction of advanced training and specialization at the undergraduate level.

The most obvious advantage of embracing a new teacher education program such as WETEP is that it permits the re-examination of subject matter and of sequencing to an extent that university traditions and vested interests would rarely allow under conventional programs. The proposed program affords an opportunity to analyze cognitive and affective objectives and to determine the optimal course content to achieve those goals. The individual curriculum in addition permits the optimal sequencing of instructional events. Research has stressed the importance of prerequisite knowledge in successful learning experiences. The WETEP instructional program allows the explicit definition of prerequisites and, with the scheduling made possible by the management system, removes the duplication of prerequisite materials in parallel classes and permits the appropriate scheduling of materials. For instance, the study of teaching methods premised upon educational psychology may be sequenced with study of educational psychology in order to avoid duplication.

The gain in efficiency through content reform and improved module scheduling is approximated by the differentials in instructional time between the current and proposed program. Table I presents the total improvement in efficiency resulting both from the improved instructional program and from judicious use of media. Project staff suggest that approximately one-half of the improvements in time requirements is attributable to basic improvements in the design of the instructional program. About 404 hours or the equivalent of 8 credit hours are gained.

A more meaningful analysis of the gains through more efficient content and sequencing is afforded by a review of the subject matter added to the curriculum in place of the time now spent in courses.

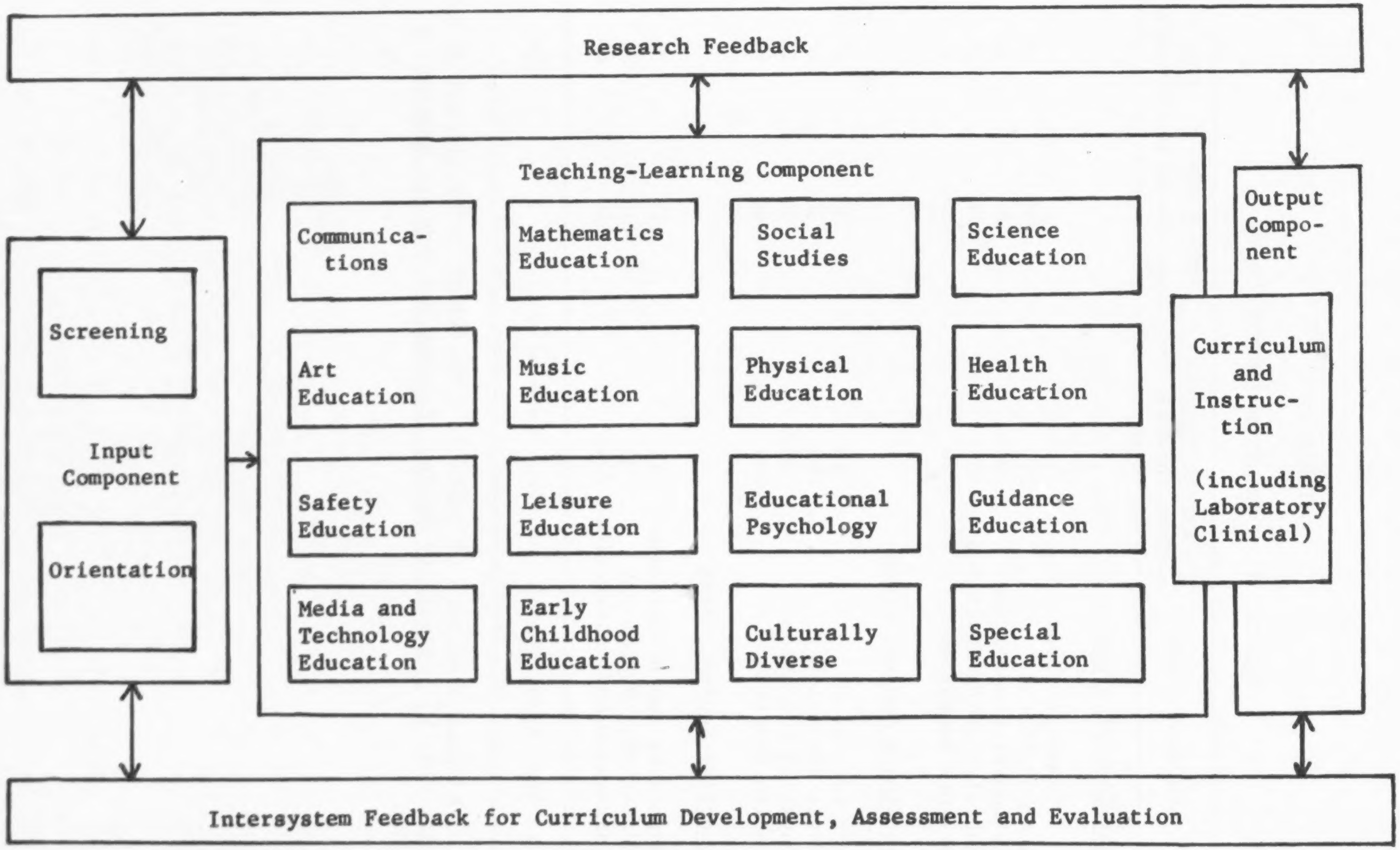

Research Feedback
Input Component
Screening
Orientation
Teaching-Learning Component
Communications
Mathematics Education
Social Studies
Science Education
Art Education
Music Education
Physical Education
Health Education
Safety Education
Leisure Education
Educational Psychology
Guidance Education
Media and Technology Education
Early Childhood Education
Culturally Diverse
Special Education
Output Component
Curriculum and Instruction (including Laboratory Clinical)
Intersystem Feedback for Curriculum Development, Assessment and Evaluation

FIGURE 1

WETEP COMPONENTS AND ELEMENTS

TABLE I*

REDUCED TIME IN WETEP CONTENT AREAS

Content Areas	Current Program Time (hours)	WETEP Basic Time (hours)	Time Savings
Major Content Areas			
Communications			
Communications	240	230	10
Mathematics Education	96	80	16
Social Studies Education	96	80	16
Science Education	96	80	16
Subordinate Content Areas			
Art Education	48	30	18
Music Education	48	30	18
Physical Education	48	30	18
Health Education	144	45	99
Supporting Content Areas			
Screening and Orientation	144	115	29
Educational Psychology	192	114	78
Curriculum and Instruction	736	650	86
Total Time Reduction in Required Instruction			404

*Adapted from part of Table I, "The WETEP Instructional Program," WETEP, Vol. V, Feasibility Study: Program and Support Systems, p. 21.

The opportunity cost of failure to exploit the economics of curriculum reform through modulated instruction may be viewed as the courses which could be added if economies were involved. The saved time permits the introduction of courses in culturally diverse, early childhood and safety education. In addition, students are able to attain advanced competency in a major area of study -- an opportunity previously restricted to graduate level study. The efficient use of student time thus facilitates the preparation of teachers for more sophisticated roles in the school of the future.

The reduction in instructional time required to meet traditional curricular objectives also implies a reduction in instructional costs. A savings of $560 in instructional costs for each graduate are obtained through the reduction in time of the basic instructional program. It is expected that these savings will be transformed into improved teacher preparation as discussed above.

The instructional program, in addition to improving the efficiency of the curriculum, offers pedagogical benefits resulting from increased student participation in instructional decisions. The program introduces active learning situations to replace passive instructional experiences; this is expected to increase learning effectiveness significantly. A review of the factors contributing to effective learning suggests that retention and comprehension are greatly enhanced by student involvement in instructional activities.[8]

The involvement of the student in decisions regarding his instructional program also promotes the development of intellectual maturity. The student is encouraged by WETEP to evaluate alternative instructional methods and to manage his own program. The WETEP staff expect student involvement in instructional management to enhance motivation.

Media. The extensive use of instructional media in WETEP permits the graphic and efficient presentation of information and more effective use of clinical experiences. The introduction of mediated instruction, in addition, allows more productive employment of professional staff; faculty may be relieved of routine information transmission functions, freeing them to provide individualized instruction. An examination of the uses to which media will be put in the instructional elements indicates the nature of the benefits which would derive from extensive mediated instruction.

In the Input Component, media is used to acquaint students with the roles, responsibilities and opportunities of the elementary school teacher. Extensive use of media permits the presentation of a realistic picture of both the preparation which the WETEP student may expect and the teaching situations in which he is to become involved.

---

[8] John M. Kean and Margaret A. Sterner, "Benefits of Systematically Relating Objectives and Instructional Media Through Appropriate Applications of Learning Principles," WETEP, Vol. V, Feasibility Study: Program and Support Systems.

In the elements of the Teaching-Learning Component, media serves several functions. Because the functions are approximately the same and vary only in extent in the several elements, they will be considered as a group here.

Media which offer a visual image (slides, films, video tapes) provide several instructional benefits. They permit the demonstration of principles and teaching techniques to students, which was not possible in the past. In this role they extend the capability of the instructional program.

Media which actively involve the student also provide a benefit not previously attainable. The filming of student microteaching experiences or student guidance sessions permits self-evaluation on the part of the student and provides the means of meaningful student-faculty evaluation of student performance. In this manner, media provides a very practical and economical means of increasing the experience of the student. Research has shown that experience is one of the most important variables in teacher effectiveness;[9] because media may offer a means of providing a teacher with learning experiences equivalent to those gained in an initial teaching experience, thus the use of media maybe an important means of improving teacher effectiveness and enhancing pupil learning.[10]

The use of communication links with schools permits students in the program to view, discuss, and evaluate classroom scenes. There is no assurance that direct classroom observation will produce examples of the kinds of behavior being studied. By having classroom scenes stored on video tapes, students may view instructional activities appropriate to particular instructional objectives, thus insuring efficient use of student observation time.

The introduction of mediated instruction permits radical redefinition of faculty roles. Faculty have in the past been used, often inefficiently, as information transmitters. In WETEP, faculty will serve in a personal capacity, either on a one-to-one basis with students or in small group seminars. In addition to providing the new function of relating material specifically to student experience and projected professional needs, faculty-student involvement will address the need to personalize education. The value of addressing the problem of disaffected students in the major university, while not readily evaluated, appears great.

---

[9] James S. Coleman, et.al., Equality of Educational Opportunity, Washington,D.C.: U. S. Department of Health, Education and Welfare, 1966.

[10] This benefit will be further examined in the subsection on educational benefits.

Management System. The WETEP instructional management system integrates the elements of the proposed program into a coherent and effective curriculum and assures the timely and efficient allocation of university resources. Personalization of instruction introduces the need for devices to sequence instructional events and to facilitate student access to educational resources. The management system *per se* serves to make WETEP feasible but also formalizes decision making processes and hence exploits the virtues of systems approaches to educational practices and research.

The contributions of the management system to the larger educational community as opposed to teacher preparation will be examined later in the report.

Screening. The WETEP screening procedures are designed to improve efficiency of teacher education by identifying persons who will respond to the program and who will contribute most to elementary education as teachers. Screening produces significant benefits by conserving both student time and educational resources. By constructing a screening procedure which exploits the insights obtained from continuing research into the correlates and the determinants of teacher effectiveness, WETEP will devise selection procedures which economize educational resources. The gains from screening are also manifest as increased success for teachers and as greater retention within the teaching profession; these benefits are discussed in the next section as benefits to elementary education.

Current screening procedures to determine a candidate's suitability for the teacher education program are limited to ascertaining whether that student has maintained a 2.5 grade point average in the first two years of his undergraduate education. WETEP will assess candidates' personality and motivation. As research on the WETEP instructional program and the effectiveness of WETEP teachers becomes available, refined screening procedures will increase the efficiency with which WETEP screening activities can predict success in teaching. The principal benefit of improved screening of entrants into the elementary education program is more efficient use of student time and university resources. The attrition rate for students within the elementary education program is now 6 per cent. The loss of students from the program prior to completion of requirements results in the waste of student time invested in specific course work and the dilution of resources being used to educate other students.

Under the traditional teacher education program, most of the resource benefits of screening would be manifest as reduced class size. The 6 per cent attrition rate suggests that the reduction in class size would be approximately one student per class. In very few instances would the changes in enrollments necessitated by screening out potential drop-outs result in reduction of the number of classes; the basic education course is the major exception to this generalization. If present class structure and sizes were preserved, the reduction by one of the number of sections of the introductory course annually would yield a benefit in terms of instructor and building resources of approximately $5,000. Under WETEP, elimination of potential drop-outs from the program would reduce resource requirements proportionally to the attrition rate.

Two aspects of the screening procedures have not yet been mentioned: whether students who leave the program have changed views of elementary teacher education and whether the students who leave the program are potentially superior teachers. Exclusion of potential drop-outs from the teacher education program may incur nontrivial costs. First, even those persons who do not complete the program are likely to obtain a more refined and accurate view of public education and hence may be expected to influence public opinion toward education. Second, exclusion of potential drop-outs will almost certainly result in occasionally sacrificing an exceptional prospective teacher. The proposed screening procedures will tend to reinforce model behavior by pre-selecting students who conform to screening criteria.

Assessment. WETEP is characterized by a comprehensive assessment program, providing pre- and post-assessment at program element and module levels. This assessment provides significant benefits directly to the instructional program. Performance objectives provide the criteria for completion of any part of the program. The use of performance objectives yields benefits both to those going through the program and to the schools who receive WETEP teachers. The benefit to WETEP students will be discussed here.

The assessment program will permit students to bypass complete or partial modules and elements in which they can demonstrate acceptable competency. A student could conceivably bypass all but his clinical experience and have demonstrated his competence to teach. Assessment instruments will ascertain a student's ability not only in terms of the mastery of knowledge but in terms of abilities to function within a classroom. The use which will be made of this option under WETEP is not predictable, in part because this option has not previously been available on a widespread, operational level as it will in WETEP. Another unmeasureable aspect of the availability of thebypass option is its psychological effect upon students. Any student feeling himself sufficiently prepared in an area to bypass a required part of the program will have readily available the means of demonstrating his competency.

The Complete Instructional Program. In addition to the benefits generated by elements of the program and the support activities, there are benefits produced by the interaction of elements. The two most important of these might be designated as the ecological view of education and the systems modeling of educational activities. Both reflect basic aspects of the philosophy of WETEP - that education must be seen as a means of meeting the needs of the whole individual in a complex society and that the elementary school teacher should serve as a model to students.

An ecological view of education and knowledge is implicit in the program. The development of interrelated modules of instruction permits the integration of learning experience without destroying the identity of traditional disciplines. WETEP exploits these relationships in designing efficient learning experiences; through well managed instruction, the program produces parallel and prerequisite skills. WETEP assures that students pass through appropriate sequences of instruction and that student competencies in related skills are developed at the appropriate time. An earlier section of the report has detailed the economies that result from efficent scheduling of materials.

The second benefit of the ecological nature of WETEP is that it effectively models the interrelations of the traditional disciplines. WETEP demonstrates the underlying philosophic system of human knowledge. It thereby enhances the teacher's grasp of the concept of knowledge and improves his ability to transmit it.

A very crude indicator of the appropriate metric to attach to the ecological content of WETEP may be obtained by examining the cost of providing a course on the systems of knowledge. This device violates the underlying ecological principle by attempting to present separately the knowledge system. In any event, if such a course were offered, the annual cost would be $114.90 per student.

Modeling is cited throughout the WETEP reports as an important role of the elementary teacher. In a slightly different context, the intensive use of mediated instructional materials provides benefits from modeling in addition to its efficiency or its effectiveness over tranditional instructional modes. The value of using media for instructional purposes not only to teach, but to demonstrate the use of media to prospective teachers is substantial in terms of time. An attempt at quantification may be made in the same manner as that adopted for measuring the benefits of an ecological viewpoint by estimating the cost of adding to the curriculum a course in mediated instruction. A course of this nature is presently offered, though not as a required part of the teacher education sequence. The estimated cost of a course in mediated instruction and uses of media per student may be given as $136.95.

Related Activities. Three additional areas of emphasis within WETEP are expected to affect its pedagogical effectiveness. However, because these activities are more directly related to general educational benefits, they will not be discussed here. They are the research activities, which include the evaluation of the effectiveness of various modes of instruction and sequences of instructional activities; teacher in-service programs which insure a continuing tie with the WETEP student once he is engaged in full time teaching; and the study of future-planning, which encompasses a continuous evaluation of the appropriateness of learning activities and program emphasis in relation to the needs of students and the schools in the future.

Benefits of WETEP to Elementary Education. WETEP obtains its justification from the impact of better teacher education on elementary education and ultimately from its contribution to the welfare of the elementary pupil and his community. This section analyzes the influences of WETEP on elementary education. WETEP is expected to produce teachers who are more effective, who will remain in the education profession longer and who will more frequently be male.

The improvements in elementary education facilitated by WETEP result from the program's focus upon student and school needs in the future. It explicitly addresses the need for differentiated staffing and more efficient use of teacher skills. The current emphasis on the teacher's role as instructor is expected to be altered to stress the teacher as tutor, challenger and learner.

Teacher Effectiveness. WETEP is designed to substantially influence teacher effectiveness. The nature of the influence will be twofold; WETEP is expected both to produce more skilled teachers directly and to contribute to the understanding of determinants of teacher effectiveness.

A comprehensive review of teacher effectiveness research has indicated that the determinants of teacher effectiveness remain elusive, in spite of many promising attempts to isolate significant variables.[11] Thus, it is difficult to provide any quantitative measure of improved teacher effectiveness through WETEP in terms of observable behaviors. However, a discussion of the validation of teacher effectiveness by society offers a promising means of obtaining a proxy measure. Salary schedules for public school teachers indicate that both experience and post certification education are valued by schools and society. The differentials paid to persons with advanced preparation suggest the social value attached to superior qualifications.

WETEP graduates will enter the teaching profession with formal academic credentials superior to those of present elementary education graduates. The WETEP graduate will not only have completed the formal course work and clinical experiences currently required of masters degree candidates, but will also have achieved the performance objectives required for effective teaching. The program effects these changes through more efficient use of student time and through a more complete instructional management system.

If it is accepted that the WETEP graduate will possess the compentencies of the present teacher with a masters degree, then we may approximate the incremental value of WETEP preparation as the present value of the additional salary payments to an average teacher. Under the present teacher education program, the average retention period is about 5 years. At a discount rate of 7 per cent, the additional competencies are worth a minimum of about $3,200 per student.

---

[11] Theodore Czajkowski and John M. Kean, "Benefits of WETEP Program to Teacher Effectiveness", WETEP Feasibility Study, Vol. V: Program and Support Systems.

3

Teacher effectiveness research also indicates that teaching experience is a major source of improved education. Again, salary schedules support this view by providing salary increments based upon experience. These increments range from $400 to $1,000 per year. The value of experience presumably flows from its contributions to the teacher's ability to deal effectively with unusual problems and to view education in a unified manner. The controlled observation of teaching provided through mediated instruction permits students to share vicariously in a much greater variety of teaching situations. WETEP, in addition, stresses the ecological view of knowledge and education affording teachers opportunities to conceive the interrelations of knowledge and hence to more effectively present and relate materials.

Evaluation of the rate at which better training and clinical experiences substitute for teaching experience is beyond the scope of the present paper. Casual empiricism suggests however, that the equivalent of perhaps a year of initial experience is replaced by WETEP. The increase in present value of an average teacher graduated from WETEP would therefore be on the order of $6,000.

Teacher Retention. WETEP is expected to improve teacher retention by providing teachers with more realistic concepts of the demands of the teaching profession and by better preparing individuals for teaching situations. In addition, WETEP will attract better qualified persons into elementary education.

Before examining the sources of these benefits, it is important to note that these effects are not necessarily positive contributions to social welfare. While from the perspective of education these are important contributions, one must examine the simultaneous impact on other socially valuable professions before evaluating the net effect on social welfare.

WETEP is expected to attract to teacher education many qualified persons who, prior to WETEP implementation, would not have entered teacher education. These persons will be of two types: those who would previously have earned college degrees in some field and thence have been lost to the labor force (e.g. housewives) and those who are induced by WETEP to choose elementary education in preference to another 'service oriented' occupation, such as social work. The effects of WETEP generated through the first group of individualsmay properly be considered a benefit of the program; unused human resources are being translated into measurable benefits. The effects in terms of benefits to elementary school children and to society from the second group are more properly viewed as income redistribution effects caused by the program; hence they cannot be credited to the benefit stream of the program. In order to evaluate the actual amount of benefit offered by the attraction of persons to WETEP, one must know the number of persons WETEP attracts who would not have entered any occupation upon graduation as well as the incremental social productivity of those who would previously have entered other occupations.

WETEP expects to increase the number of years a teacher spends working actively in the profession, by altering both teacher retention rates and rates at which teachers return after leaves of absence. The current picture of teacher retention and WETEP's supposed effects on the situation have been discussed elsewhere.[12] Because the teacher retention issue is really composed of two discrete problems--retention of men teachers and retention of women teachers--certain societal aspects of these two problems are appropriately examined here.

WETEP will take advantage of societal trends regarding the employment of women. As it becomes increasingly acceptable and customary for women with families to seek full or part-time employment, more women will spend years in the labor force.[13] They may be expected to assume the best (most prestigious most rewarding or most profitable) position for which they are qualified. WETEP facilitates specialized and/or part-time teaching opportunities in the schools of the future and hence, improves the utilization of women trained in elementary education who prefer part-time employment.

WETEP also makes possible the return of persons to positions in elementary education after having been absent from the profession for a few years. (This group obviously will consist primarily of married women.) The In-service education opportunities of WETEP are structured in such a way as to be particularly helpful to persons who wish to extend or supplement their earlier preparation. The potential benefits of this type of program have been demonstrated in other areas of university operation. The UW extension division program to provide re-education opportunities to registered nurses who have not practiced recently has been particularly successful. Personal profiles of all in-service students will enable the designing of a program which will meet the particular needs of the individual in the least possible time and at the least cost.

Increased Numbers of Men in Elementary Teaching. The attraction of men to teaching is a topic which should receive special scrutiny. Both the benefits expected from more men in the elementary schools and the ways in which WETEP is expected to increase their numbers cannot be precisely specified but because of the importance of the topic, both aspects of the issue will be briefly examined. The maternal character of most elementary schools is not congruent with the character of most of the real world. While the psychological effect of this characteristic has not been measured, the identification of the school with feminine behavior and interests may have significant effects on the creativity and the acceptance of school by boys. Men in the elementary school are now usually identified with authority, particularly disciplinary activities. Boys have few opportunities to see males in roles other than that of father or disciplinarian.

---

[12] John M. Kean and Donald N. Lange, "Benefits to Teacher Retention From WETEP," WETEP, Vol. V, Feasibility Study: Program and Support Systems.

[13] Glen G. Cain, Married Women in the Labor Force; An Economic Analysis, Chicago: University of Chicago Press, 1966.

WETEP expects to alter the number of men entering elementary education through the presentation of a different image of elementary school education, different instructional opportunities in the schools.

Male teachers in elementary education are upwardly mobile to principalships, to other administrative positions and to high education. Aside from the influence of differential salaries upon these decisions, opportunities for advancement of teachers which WETEP foresees within the organization of the school of the future should provide some incentives for remaining within elementary education. However, WETEP will probably not significantly affect rates of retention among male elementary teachers, although the absolute numbers of males in elementary education is expected to increase.

Benefits of WETEP to Social Welfare. This section examines the social values of WETEP. The contributions of the model programs to teacher preparation and elementary education are instrumental in nature and hence are of ultimate significance only as they serve to enhance individual or community welfare. Because the present level of abstraction is remote from the points of initial program impact it is impossible to attach measurements with any confidence;this analysis, however, provides the policy maker with the appropriate framework for evaluation of the economic efficiency of WETEP and with an intuition for the social utility of the proposal.

The conceptualization of social benefits is more abstract than the formulation of pedagogical or educational benefits. Therefore, it is necessary to examine the nature of social benefits and the rationale for their inclusion in this benefit analysis. An economist is concerned with maximizing total social welfare as opposed to the well being of a sub population or particular dimensions of welfare. In an economic analysis, competing projects are examined on the basis of their expected contribution to the collective welfare. The definition of welfare and the identification of the population to be affected are necessary adjuncts to the total presentation of expected effects of the program.

The characteristics of teacher education activities complicate the estimation of social welfare to be generated by WETEP. The traditional methods of measuring social welfare in which an individual's consumption decisions are assumed to reflect his underlying preferences for goods and hence his own estimates of what contributes to his welfare, fails when applied to the measurement of social welfare produced by education. The two most significant complicating factors are briefly examined in order to indicate the limitations which they impose upon this analysis of social benefits. First, the preferences of society for the outputs of public education are not revealed through market mechanisms but rather through political processes. No metric significance can be attached to the price of education inasmuch as it does not reflect consumer choices but rather the wishes of a political majority. Many public projects produce goods which are intermediate goods serving in the production of goods which are ultimately purchased and consumed by individuals. The value of such public goods may be inferred from the preferences of consumers for the final good. While education contributes to the economic productivity of workers and hence might in principle be evaluated by inference from the value of goods and services produced by the labor, no one would seriously argue that this approach provides anything more than a very partial view of the value of education. Education, particularly at the elementary level, is much more than investment in human capital.

Second, the contribution of teacher education to the educational process remains elusive. Even if the preferences of society for education were perfectly revealed, no satisfactory theoretical or empirical basis exists for inferring the value of teacher education. Such an exercise would require knowledge of the impact of controllable teacher characteristics on desired educational outcome. The fact that elementary education is very early in the chain of events that produces a graduate from the educational system compounds the problem of identifying the preferences of society for improved elementary teacher education.

In spite of the formidable problems which these two factors pose in any attempt at a rigorous analysis of social benefits of a teacher education program, many social benefits of education are evident. This section will not present a complete analysis of the social benefits of WETEP but will enumerate the major areas of benefit provided to individuals by educational activities. It then will address the question of the effects upon benefits to be generated by WETEP.

Education produces three species of social benefits. First, education is an intrinsically valuable good; the act of education produces immediate consumption services which most but not all persons regard as being of positive value. Second, education is a consumer durable good; it enables a person to assume larger responsibility for his affairs and welfare within society. Third, education is an intermediate good entering both in the production of more advanced education and in the production of economic goods. Elementary education is obviously prerequisite for secondary education and the literature on prerequisite skills suggests that this relationship is nontrivial; if social welfare is defined by the scope of individual choice, then providing opportunities for more advanced education is clearly a social benefit.

WETEP is expected to contribute to socail welfare through its effect on the education of grade school children by WETEP graduates. The three social benefits which are discussed here must be viewed not only in terms of their effects in relation to current economic, social, and political demends upon individuals, but also in relation to the importance which is expected to be attached to them in the future.

Economic Productivity. The most obvious social benefit of education, perhaps becuase of the ease with which it may be measured, is the value of education to an individual's economic productivity. Two aspects of this social benefit are examined here: the relation of education to economic productivity and the manner in which WETEP will enhance an individual's productivity through education.

The relationship between formal education and an individual's expected future income is widely recognized. In particular, studies indicate significant differences in expected incomes for high school and college graduates. These findings, based on descriptive statistics obtained from adult lifetime income profiles, do not illuminate the question of causality. More detailed multivariate analysis of the influence of education on individual earnings reveal that the quality of education, "ability," family wealth, and extra school socialization are important determinants of personal earnings. Years of education becomes a relatively insignificant variable in multivariate studies. The mechanism by which education increases incomes and accelerates national economic growth remains elusive. Some writers argue that profound changes in the economic roles fulfilled by individuals are accomplished through education. Others maintain that education enhances productivity within a skill or occupation. Casual empiricism suggests that both hypotheses are valid and that education operates on the economic welfare of individuals and of society by improving personal discipline, problem solving ability, verbal skills and by permitting additional maturation and thereby facilitating changes in roles and success with occupations.

The emphasis of WETEP upon individualization of instruction, choice in the instructional program, mediated instruction and humanization of education provides additional skills particularly relevant to future economic activity. The elementary school, if modeled after WETEP, would provide students with problem solving abilities, consciousness of the interdependencies of ideas and variables, and familiarity and cooperativeness with technology. While it is impossible to quantify the value of these changes, there is a very strong presumption that the impact on economic productivity particularly among the disadvantaged would be major.

Socio-Political Sophistication. An increasingly important function of education is to facilitate socio-political activities. Education increases social mobility, enables persons to define social and political roles and develops lightened awareness of socio-political problems and responsibilities. Trends in urbanization and geographic mobility are radically increasing the importance of these functions.

WETEP is designed to prepare teachers who recognize and respond to the importance of values and value formation. WETEP does not advocate dogmas or social indoctrination in the classroom, but rather stresses the need for all persons to understand the bases of social choice, the relationship of values to social action and the importance of respect for personal values. The emphasis within WETEP on personalization of instruction is one example of the commitment of the program, in method as well as in content, to addressing the basic societal need for increased awareness and respect for persons and their individual differences.

Expansion of Opportunity. An indicator of social welfare is the breadth of opportunities and choices available to individuals within the society. Grade school education effects the opportunities available to grade school graduates in two important areas: occupational goals and educational goals. WETEP is expected to contribute to the expansion of opportunities for grade school students in both respects by substantially improving the quality of elementary education.

Accellerated technologicalchange affects the nature of available jobs; the importance of an education that provides for flexibility has been mentioned in discussing economic productivity. Increasing the number of years a person spends in formal educational activities is no guarantee of expanded or improved job opportunities. The fundamental changes in the content of and approaches to elementary education envisioned by WETEP and presented throughout WETEP reports are required to insure a wide range of occupational choice.

The importance of early educational experiences to later success in formal education has been carefully examined in research studies and alluded to earlier in this report. The importance of prerequisite knowlege to academic success and the number of viable advanced educational opportunities increases the importance of quality education in the elementary school. Schooling which expands the option value of education offers a significant benefit to individuals and to society as a whole. WETEP is designed to prepare teachers who can expand the educational opportunities of its students.

Distributional Effects of WETEP Benefits. Benefit-cost analysis is a technique for maximizing the total welfare of society; it does not explicitly address the question of equity in distributing the benefits obtained from economic resources. In principle, the distributional problems generated by the optimal allocation of resources could be alleviated through a system of supplementary transfer payments. Many social critics argue that several goods, education and health care being more important, because of their intrinsic value, are in some sense above the benefit-cost criteria and should be allocated on equity grounds alone. The additional argument has been made that the vicious cycle of poverty is a consequence of unequal access to education and health care and that social ethics demand that efforts be made to improve access to these services.

It has been proposed that a benefit-cost analysis include a secondary analysis of who does and does not benefit, to accompany the benefit cost presentation. The implementation of a project may guarantee either higher consumption for particular individuals or increased opportunities for consumption. Increased consumption and increased ability to consume are not synonymous. The consuption patterns produced or made available by a project are an appropriate concern of a policy maker who must decide between competing projects which affect different populations. While two projects may produce equal measured benefits, a social welfare function reflecting the policy maker's preferences may influence a choice between them.

A consideration of distribution effects does not alter a quantitative analysis of benefits and costs. But the significant distributional effects expected from WETEP are mentioned in the analysis to enable the policy maker to extend the implications of this analysis to more general social welfare decisions.

WETEP is expected to significantly improve access to equal educational opportunities. WETEP is likely to have somewhat greater influence on underprivileged rural or urban children because of the improvements in quality and continued support of elementary teachers educated in WETEP. Currently, the distribution of graduating certified teachers to elementary schools reflects the academic records or quality of recommendations of teachers, and the ability of the school to offer high prestige positions and high salaries. With notable exceptions, of course, teachers with superior credentials are more likely to find employment in superior suburban, middle class schools.

WETEP will reduce the inequality of educational opportunities by supplying teachers with superior qualifications. The performance objectives of WETEP which define student progress in the teacher education program impose minimal levels of competency on graduating teachers. This assures that substandard teachers are not being supplied to schools. In effect, WETEP truncates the left tail of the distribution of teacher abilities through more effective, individualized preparation.

Summary. No attempt has been made in this presentation of social benefits to quatify the extent of WETEP's expected impact. Because this discussion has been tentative, and because of the lack of knowledge about the exact, underlying relationships hypothesized here, any hypothetical quantification would have been premature.

At least one conjecture is appropriate here, however. All of the benefits discussed here will become more significant in the future, due to projected societal changes. Technology will not become less important; urbanization and its associated problems will not diminish. Therefore, this section probably understates the social contribution which can be anticipated from WETEP.

A particularly elusive category of WETEP benefits is the group accruing to education generally. The discussion of WETEP benefits above has focused upon the impact of the project upon elementary education and thereby upon the welfare of individuals educated by WETEP graduates. WETEP is expected to produce important insights into the feasibility and efficiency of mediated and individualized instruction which may be generalized to nonelementary education as well. The proposed program affords unique opportunities to investigate the usefulness of these techniques in an ongoing program; the WETEP management system and future-planning center provide a formalized, continuous program of evaluation research and dissemination of knowledge on educational technology.

The WETEP experience is also expected to contribute to the process of developing new educational technology. The program will provide insights into the usefulness and economic efficiency of refined configurations of computers and media devices; continuous research into program effectiveness should indicate the appropriate focus of development efforts in educational technology.

Benefit Analysis Summary. Systematic evaluation of the effects of implementation of WETEP has revealed numerous and important benefits to teacher preparation, elementary education and social welfare. This study has demonstrated that the proposed program produces significantly better elementary school teachers who will improve the quality of elementary education and hence raise the welfare of pupils both immediately and throughout their lives. The quantification of the welfare effects of WETEP would require more advanced theory and empirical knowledge of education than is presently available. In view of this problem, a variety of partial, non-rigorous devices for quantifying the implications of WETEP have been adopted. While these measures do not meet the requirements of a formal benefit-cost analysis, they do provide an intuitive grasp of the nature and magnitude of WETEP effects.

Cost Analysis

This section summarizes the development, implementation and operating costs of WETEP to provide the basis for comparisons of WETEP benefits and costs. A complete costing of development and implementation phases of WETEP has been presented elsewhere;[14] the purpose of this discussion is to present a summary of costs in a format which will facilitate the economic analysis. The costs of operating WETEP once it has been developed will be presented first, followed by a presentation of development costs.

Operating Costs. This subsection presents costs of operating the current elementary teacher education program and expected operating costs of WETEP. The costs of both the current program and WETEP are included to facilitate an examination of the areas of expected changes in operation costs. The advantages and disadvantages of this type of cost presentation should be briefly mentioned. Presentation of both current and WETEP costs is consistent with the presentation of WETEP benefits. The benefit analysis was directed to an examination of the manner in which WETEP will alter the returns from resources invested in teacher education. This section as nearly as possible presents comparable information on altered costs.

---

[14] LeRoy Peterson and Thomas Flygare, "Pricing WETEP Development," WETEP, Vol. VI, Feasibility Study: Pricing and Economic Analysis.

Any attempt to compare operating costs of the present program and WETEP poses severe problems in attempting to identify comparable program categories. Because WETEP represents a complete restructuring of activities required for teacher preparation, comparing WETEP elements with existing courses fails to demonstrate the restructuring of instructional materials, the interrelatedness of WETEP elements, and the flexibility of the program. These caveats must be kept in mind in examining the program categories identified in the operating cost presentations.

In keeping with program budgeting procedures, operating costs have been assigned to specific instructional elements wherever the assignment was appropriate, justifiable and estimable. In areas where costs were essentially sunk, as in administrative activities, and where small reductions of the scope of the program would produce no change, categories were considered as indivsible and presented separately.

Table II presents comparative operating costs for the current instructional program and for WETEP estimated in 1969 dollars. The incremental values resulting from increased operating costs of WETEP identified in Table II will be used as the basis of comparisons of benefits and costs to be offered in the next major section of the paper.

There are two reasons for employing an incremental cost approach: one resulting from the subject of this economic analysis, an elementary teacher education program; and the other reflecting the economic question addressed in the analysis. First, benefit cost analysis has not been directed to teacher education programs. The return on higher education expenditures in terms of numbers of teachers prepared, their length of service and their effectiveness has not been calculated. The extent to which current procedures are or are not optimal in the economic sense is largely unknown. Because time limitations on the present analysis do not permit a complete study of the effectiveness of current expenditures, this cost section is constrained to include only an examination of expected changes in cost, as a parallel presentation to the analysis of expected changes in benefits. Second, an economic analysis must focus on the issue of whether the implementation of WETEP and the ongoing commitment of additional resources which that implementation implies is economically justified. The estimation of those additional resources must be compared with the estimation of additional benefits.

An important factor to consider in examining the incremental instructional costs of WETEP is their expected behavior over time. The operating costs of WETEP can be expected to decrease in comparison with costs of a traditional program over an extended time horizon. WETEP represents a dramatic shift from a program operated almost exclusively by professional staff to one characterized by mediated presentation of instructional material and differentiated staffing patterns. Thus, expected changes in technological costs and personnel costs are an important consideration in evaluating the relative costs of WETEP in comparison with the current program. The plight of increasing costs in service oriented industries, where high proportions of costs are due to employee salaries, has been the subject of study by

TABLE II

COMPARATIVE ANNUAL OPERATING COSTS* FOR THE CURRENT ELEMENTARY TEACHER EDUCATION PROGRAM AND WETEP

Program Category	Costs per Student		
	Current	WETEP	Increment (WETEP-Current)
Elements			
Communications	$ 160,131	$ 179,900	$ 19,769
Mathematics Education	69,708	105,529	35,821
Social Studies Education	69,708	99,208	29,500
Science Education	69,708	125,273	55,565
Art Education	20,724	59,588	38,864
Music Education	20,724	52,184	31,460
Physical Education	20,724	38,088	17,364
Health Education	64,089	61,105	- 2,984
Safety Education	-	27,532	27,532
Leisure Education	-	15,308	15,308
Screening	-	12,219	12,219
Orientation	62,388	70,038	7,650
Educational Psychology	54,129	102,508	48,379
Guidance Education	-	28,451	28,451
Media and Technology Ed.	-	34,985	34,985
Curriculum and Instruction	23 ,507	579,498	342,991
Early Childhood Education	-	24,396	24,396
Culturally Diverse	-	55,628	55,628
Special Education	-	45,216	45,216
Support Systems			
Computer Management System	-	785,231	785,231
Media and Telecommunications	-	896,742	896,742

* 1969 Dollars

economists.[15] Costs for activities which require large proportions of labor rather than capital can be expected to increase markedly. On the other hand, costs for functions which can be performed by capital intensive methods will decline, relatively, and in some cases, absolutely. Those services or industries which are best able to utilize some forms of captial intensive, as opposed to labor intensive, resources stand a better chance of maintaining or increasing the quality of goods and services they provide without increasing costs.

WETEP will not replace faculty members with mechanical means of instruction. Rather the program is designed to take advantage of the opportunities offered by technology to increase the effectiveness of the time spent in instructional activities by professional staff. WETEP shows a significant proportional shift to capital intensive costs away from labor intensive costs. Less than 3 per cent of the current instructional program costs reflect capital intensive instruction. In contrast, 37 per cent of WETEP costs are attributable to capital intensive instruction or instructional management. These altered percentages suggest that WETEP, if evaluated over an extended time horizon, will become increasingly economical. This subject will be explored more fully in the section comparing costs and benefits. At this point, it should also be noted that the returns from implementing a program structured as WETEP is structured may be expected to be very high in terms of the research and development results which it would generate for the future, when the program becomes more economically efficient.

Numerous support activities will be conducted as part of WETEP operation. In a limited sense, they may be regarded as the aspect of the program which will insure its relevance over an extended time horizon. However, they also contribute to the efficiency of the program and hence to securing many of the benefits identified in Section One. The annual costs of maintaining these support activities is shown in Table III. The current instructional program does not formally conduct comparable activities and hence no appropriate comparative estimates can be made.

Development Costs. Major development activities are scheduled for a five-year period beginning in September 1970. This subsection presents estimates of expenditures required to develop the instructional program and related support activities.

Categories similar to those used in presenting operating costs have been employed in summarizing development costs. Where activities are not assignable to instructional elements, they are presented as individual items. Table IV shows total development costs for WETEP program categories in 1969 dollars.

---

[15] William J. Baumol, "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis," American Economic Review, Vol. 57, No. 3, June 1967. pp. 415-426.

TABLE III

WETEP SUPPORT ACTIVITIES *

Activity	Annual Cost
WETEP Administration	$ 56,241
Assessment	152,032
Faculty In-service	282,388
Future-Planning Center	79,325
Research Center	243,555

*1969 Dollars

TABLE IV

WETEP DEVELOPMENT COSTS*

Program Category	Estimated Development Costs
Elements	
Communications	$ 560,240
Mathematics Education	316,978
Social Studies Education	236,785
Science Education	562,770
Art Education	504,332
Music Education	269,899
Physical Education	216,916
Health Education	313,506
Safety Education	
Leisure Education	271,259
Screening	32,063
Orientation	225,112
Educational Psychology	402,839
Guidance Education	114,901
Media and Technology Education	245,707
Curriculum and Instruction	317,942
Early Childhood Education	297,577
Culturally Diverse	675,892
Special Education	693,365
Support Systems	
Computer System	3,228,523
Management System	301,245
Media and Telecommunication	5,019,710
Assessment	1,437,603
Faculty In-service	755,102
Future-Planning Center	430,040
Research Center	1,075,507

* 1969 Dollars

Difficulties arise in attempting to allocate development costs to the benefited students or equivalently in evaluating the present value of the future stream of benefits from development. WETEP will provide benefits over an extended time horizon; the exact determination of that horizon depends on the extent to which the program remains relevant to current and anticipated future societal needs. This, in turn, depends on the success of feedback, research and future-planning activities. While such activities are expected to contribute markedly toward maintaining an optimal program, because of the uncertainty of societal and institutional change, estimates of time horizons are at best tentative. Because WETEP is a dynamic model program, and hence in part a research and development program, to distribute development costs over one year's or even ten years' graduates at a particular school is to violate the fundamental premises upon which the models program was designed. All instructional materials and operating procedures developed during the five-year development phase will be readily available to all institutions engaged in teacher education programs. Implementation costs, only, primarily in the form of capital expenditures for media hardware and expenditures for faculty in-service, would be borne by an implementing institution. These costs are examined elsewhere.[16] In order to provide an intuition for the per student cost of development, we have examined the implications of 5 to 50 per cent adoption for periods of 20 to 50 years. The results are summarized in Table V.

Summary. This section has summarized portions of the cost analysis conducted in Phase II to facilitate the economic analysis of WETEP. Where possible, operational and developmental costs have been associated with particular activities or parts of the program to permit the evaluation of WETEP on the basis of separable activities. The next section will relate benefits identified in relation to the costs presented here.

Comparison of WETEP Benefits and Costs

A formal benefit cost analysis requires the calculation of the ratio of the present values of the expected benefits from a proposed program to the present value of costs imposed by the program; a ratio exceeding one indicates that resources could more productively be invested in the program than in the private sector of the economy and therefore that the program is economically efficient.

The benefit analysis of WETEP resulted in the identification of numerous expected benefits. In some cases, benefits which were not

---

[16] LeRoy Peterson and Thomas Flygare, "Pricing WETEP Development," WETEP Vol. VI., Feasibility Study: Pricing and Economic Analysis.

TABLE V

PER STUDENT DEVELOPMENT COSTS
(WITH VARYING TIME HORIZONS AND EXTENT OF IMPLEMENTATION*)

Time Horizon	Extent of Implementation			
	5 Per Cent Adoption		50 Per Cent Adoption	
	Number of Students	Cost per Student	Number of Students	Cost per Student
20 years	200,000	$53.78	2,000,000	$ 5.38
50 years	500,000	21.51	5,000,000	2.15

*using as base figures 200,000 certified teachers graduating annually and $10,756,000 development cost for instructional and support activities.

directly quantifiable were measured by calculating the cost of achieving a roughly comparable objective by alternative means. This type of benefit quantification offers some insights into the value which may be attached to a particular return but does not provide a comprehensive measure of the social utility of the benefit.

The absence of complete benefit measures precludes calculation of a benefit cost ratio in this analysis. However, several means of comparing benefits to costs may be explored in order to reduce the amount of impressionistic judgement that must be employed in an economic evaluation of WETEP. Benefits expected from WETEP at the program element and total program levels may be enumerated in relation to their incremental operating costs. An enumeration of this form provides both those designing and those evaluating the program with an estimate of the cost attached to securing a desired benefit. An itemization of benefits and incremental costs at the level of program categories, as well as at the level of total implementation, is shown in Table VI.

In addition to simply presenting benefits in comparison to the costs of achieving them, two additional means of examing benefits in relation to costs will be reviewed here. First, an examination of the expected behavior of benefits and costs over time provides insights into the changing economic viability of the proposed program. Second, a consideration of partial levels of program implementaion and of changes in benefits expected to accompany increments in implementation levels permits an estimation of the most economical level of program implementation.

Expected Changes in Benefits and Costs of WETEP Over Time. The WETEP benefit-cost ratio is expected to increase over time in response both to the reduced cost of technology and the increased social value of program benefits. In addition, the research potential of project operation will permit more effective use of the program, further increasing the returns from the program as well as generating significant insights into educational processes. The benefit analysis suggests that the need for quality education at all levels is increasing; the general societal needs identified in the discussion of social benefits will become more acute. The WETEP instructional program is explicitly designed to meet the needs of the future and hence should provide increasingly greater returns over time. The social value of these benefits may also be expected to accelerate.

In contrast to benefits, WETEP operating costs may be expected to decrease over time. A large portion of WETEP development and operational costs may be attributed to technology and the personnel required to support the technology. The costs of technological services in proportion to the amount of their use are declining and can be expected to continue to decline in the future.

The capital cost of the terminals which provide mediated instruction will decline markedly with refined designs and mass production. Similarly, advanced computers will offer cheaper computing than do earlier machines. Thus, implementation of technological support at the scale planned for

TABLE VI

COMPARISON OF WETEP BENEFITS AND COSTS

WETEP Program Category	Annual Incremental Cost	Benefits
1. Instructional Program	$ 855,895	1.a Individualized curriculum 1.b Optimal sequencing of instructional events 1.c Student involvement in instructional activities
2. Media	896,742	2.a Graphic presentation of information 2.b Effective use of clinical experiences 2.c Efficient use of professional staff
3. Management System	785,231	3.a Insured feasibility of personalized instruction 3.b Formalized decision-making processes
4. Screening	12,219	4.a Economy in educational resource use 4.b More effective teachers 4.c Increased teacher retention
5. Assessment	152,032	5.a Use of performance objectives 5.b Instructional bypass options
6. Total Instructional Program	2,702,119	6.a Ecological view of education 6.b Systems modeling of educational activities
7. Total WETEP Project	3,363,628	7.a Improved teacher effectiveness 7.b Increased teacher retention 7.c Increased numbers of males in elementary teaching

TABLE VI (Continued)

WETEP Program Category	Annual Incremental Cost	Benefits
8. Research Center	$ 243,555	8.a Increased understanding of teacher effectiveness
		8.b Determination of factors in teacher retention
		8.c Evaluative research on mediated and individualized instruction
		8.d Cost-effectiveness of program operation
9. Future-Planning Center	79,325	9.a Continued relevancy of instructional program
10. Faculty In-Service	282,388	10.a Effective performance of new faculty roles

WETEP will probably become economically feasible for large numbers of schools engaged in teacher education. It is estimated that the cost of computer facilities employed by the project might decline by as much as 70 per cent over the next decade while the cost of personnel in professional education may be expected to increase by at least 6.6 per cent annually.

The research and development efforts which are an integral part of WETEP not only will serve to maintain relevancy within the instructional program, but will offer substantial progress in determining the relationships between educational experiences and outcomes, the factors which contribute to teacher effectiveness and the exact role of early educational experiences to later adult successes. Thus they will permit a refined economic view of educational activities as well as extend basic educational research.

The preceding discussion suggests that WETEP will become more economical in the future. This assertion is in one sense justified; however, WETEP is a model program and a principal objective of the program is to provide evidence as to the viability of a highly personalized instructional program which makes extensive use of mediated instruction. This evidence will be available for the perusal of educators in the future only if it is generated now through a dynamic model program. Furthermore, extensive research and development of materials and media must be embraced if the approach is to be adopted generally.

Economic Consequences of Partial WETEP Implementation. A determination of the most economic level of WETEP implementation must be a part of an analysis of whether the program is economically justifiable. An appropriate concern of the present analysis is whether total implementation of WETEP is more efficient than only partial implementation. A refined, detailed analysis of this issue is not possible here. Nevertheless, some insights can be obtained by addressing the question, "Why not model one or two instructional elements of WETEP?" Both the benefits and the costs which would result from partial implementation are therefore discussed here.

The benefits from partial or full implementation of WETEP may be predicted from an examination of the benefit analysis. Pedagogical benefits relating to instructional efficiency and mediated presentation would accrue to any element which was implemented. The benefits of seeing the content and methodology of elementary education as a total system would, however, be lost with partial implementation. This is exemplified by the interrelationships among the Mathematics Education, Science Education and Educational Psychology elements. A student taking Mathematics Education modules would miss the opportunity to see ways in which specific mathematical concepts might be reinforced through science activities. He would also fail to understand the extent to which certain basic mathematical concepts serve as prerequisites to the understanding of basic concepts in science, or the ways in which concrete experiences in scientific observation would provide the basis for understanding mathematical principles. The opportunity to fully integrate his understanding of science and mathematics teaching would still not provide maximum learning on the part of the WETEP student unless it were related to an understanding of a child's capabilities and the stages by which children learn.

In addition to affecting the extent or nature of benefits generated by the program, partial implementation would affect the benefit audiences affected by WETEP. Benefits from specific instructional elements are related to learning efficiency, and hence are received primarily by the WETEP student. The interaction benefits which are the result of seeing and understanding the range of concepts presented in the elementary schools as a system are received not only by WETEP students, but also by their pupils in elementary schools. The educational benefits of WETEP identified earlier depend on the effects of the total program upon increased teacher effectiveness, teacher retention and numbers of males in elementary education. These and similar significant social benefits cannot be expected from WETEP unless the total model program is implemented.

This summary of the benefits which can be expected from WETEP suggests that the benefits from the program increase more than proportionately with levels of implementation. Furthermore, the nature of the benefits shifts, with more general benefits being obtained with higher levels of implementation. Benefit audiences also expand with full implementation.

This discussion of the benefits expected from partial implementation also suggests that partial implementation of WETEP at another institution would not generate the more general benefits to elementary education or to social welfare which were examined in the benefit analysis. Significant benefits for teacher preparation, however, in terms of learning efficiency and pedagogical effectiveness, would accompany the adoption of portions of WETEP.

The costs of developing and operating any single element can be obtained from Tables IV and II in the cost analysis section of this report. Operating costs for each element are shown for a program which graduates 300 students annually. Development costs include design and preparation of all instructional materials for the element; this cost includes provision for alternative instructional modes to permit student choice. Development costs for instructional elements are approximately proportional to the planned number of modules for the elements. It has been assumed that preparation of initial modules over the development period would require somewhat more faculty time than preparation of remaining modules. Otherwise, differences in development costs reflect differential amounts of usage of particular mediated modes of instruction.

Development and operating costs would increase slightly if only one or a few elements were developed as a consequence of the design of the program. Planned interdependencies among elements cited in the benefit analysis section are one reason for the reduced total instructional time in basic studies for WETEP. These interdependencies would be nonexistent with only partial program implementation. For example, both the Mathematics Education and Science Education elements may require that students take a module in concept formation from the Educational Psychology Element before proceeding with topics in the Mathematics or Science elements. The two elements which required the unit originally may not have developed it. Development of the Mathematics Education element on a demonstration basis would require the preparation of the module from Educational Psychology in addition to those already designed. Thus each element, if developed independently of all others, would incur somewhat higher costs than are represented in Table IV.

The development and operating costs of support systems not allocated to instructional elements would have to be considered in partial implementation. The management system envisioned here would be superfluous if only two or three instructional elements were installed. The management system cost, composed primarily of computer costs and related personnel costs, would be almost eliminated. Some costs would be incurred in tying the demonstration elements into an existing computer installation. The research activities related to the program would be considerably less with partial implementation though not proportionately less. Specific research planned to study the effectiveness of particular instructional modes would be focused upon a few subjects instead of many, but would not be substantially reduced in volume. Other support systems, such as the study of the future and its implications for education are independent of the instrucational program and could be either curtailed or retained.

In summarizing the effects on costs of partial development and implementation, some economies of scale may be observed in the planning of instructional activities and of the research support system. These economies would, however, probably be swamped by the additional cost of a computer managed instructional system which would be required if more than a few elements were implemented. Thus the costs incurred by partial program implementation should be approximately proportional to the level of implementation.

This overview of expected changes in costs and benefits provides insights into the behavior of the benefit-cost ratio. Benefits increase faster than costs with higher levels of implementation; the program therefore can be expected to offer the highest possible ratio of benefits to costs when it is fully implemented.

Supplementary Analysis. A comparison of benefits and costs should provide a reader with an intuition for the economic justifiability of the project and the scope of expected returns. A perspective slightly different from that offered by a traditional benefit-cost presentation may be obtained by addressing two questions pertinent to an economic analysis of the program: What would be the consequences, both in terms of benefits and costs, of attempting to provide a WETEP-type program within the institutional context and pattern of the current program? and To what alternative uses could the incremental resources required for WETEP operation be put? Illustrative answers to these questions suggest a more informal, as well as narrow, method of economic analysis than benefit-cost analysis.

Costs of WETEP Alternatives. Many benefits identified in the

POOR ORIGINAL COPY - BEST
AVAILABLE AT TIME FILMED

analysis of expected WETEP benefits were measured by calculating the cost of achieving them by some alternative other than WETEP. The costing of alternative ways to achieve an objective is basically cost-effective in its posture. An examination of the costs necessary to approximate WETEP through supplementing the existing teacher education program provides a partial basis for evaluating operating costs of WETEP.

Table VII lists the additional courses required to approximate WETEP by adding to the current teacher education program. The identification of courses to be added is obtained from the benefit analysis. The determination of instructional costs of the present program performed as part of the cost analysis permits the application of a dollar measure to the estimated number of additional course credits required. Costs of student time incurred by adding courses are also calculated in Table VII. Student time is converted to an estimate of earnings foregone in order to participate in classes. The table relates the operating costs of a traditional program, supplemented by additional courses, to WETEP operating costs.

Table VII provides a means for comparing operating costs of WETEP to expected costs of attempting to approximate WETEP through supplementary courses. The table shows that the costs of approximating the WETEP instructional content would be $5,741.74 per student. This compares with WETEP costs per student of $7,157.47 in 1969 dollars. This cost comparison does not offer a comparable comparison of benefits from the two alternatives. The supplemented program gives no assurance that any of the benefits to elementary education or to social utility expected from WETEP would be achieved. In addition, there would be no returns in the nature of evaluative research; hence the alternative would produce far fewer benefits than WETEP.

Opportunity Costs of WETEP. A useful means of evaluating the desirability of a proposed project is to explore opportunities which could be achieved by alternative uses of the resources required by the project. The operating costs of WETEP represent an annual incremental cost of $11,728 per student over the operating costs of the present program. If one assumes that this amount is available annually to be spent in activities related to elementary education or to the education of elementary teachers, one may explore alternative feasible patterns of expenditure.

The application of this opportunity cost principle to a review of the incremental cost of WETEP is in some ways simply a narrow view of benefit-cost analysis, insofar as it evaluates the program in terms of foregone educational opportunities in place of foregone social costs.

The incremental budget for WETEP operation could, if applied to the current budget for teacher education, permit doubling the professional staff (from approximately 22 to 44) at current salaries and supplying each faculty member with a research assistant at 20 hours per week and a teaching assistant at 20 hours per week. In addition, each of the 600 students in the program could be granted $100 in disposable instructional materials, plus a stipend of $4,400 to participate in the program.

TABLE VII

COST OF APPROXIMATING WETEP WITHIN THE PRESENT PROGRAM FORMAT

Course Outline	Dollars	Additional Student Hours
Cost of the Present Teacher Education Program per Student	$ 2,869.00	-
One-half credit each in		
Safety Education	28.72	20
Leisure Education	28.72	20
Guidance Education	28.72	30
Media and Technology Education	36.07	23
Early Childhood Education	28.72	20
Culturally Diverse	28.72	20
Special Education	28.72	20
Two credits each in		
Media Usage	136.95	96
Ecology in Education	114.90	96
Subtotal	3329.24	365
Foregone Earnings of Student Hours $2.50 per Hour	2412.50	
Total Social Cost of Approximating the WETEP Program (per student)	$ 5,741.74	

A cursory evaluation of this alternative plan suggests that it would in some measure improve both the quality and the personalization of instruction in an elementary teacher education program, as well as improve the quality of educational research. The plan contains no guarantee of improved instructional design or more relevant education for teacher education students. In addition, it offers no assurance of improved teacher effectiveness.

A second example of the opportunity costs of WETEP may be obtained by examining a program to distribute the resources directly to chosen elementary schools. A salary increment of $2,000 per year plus the choice of $1,000 in desired instructional resources could be offered annually to 1,145 teachers in disadvantaged schools. While this alternative might improve the quality of elementary education, its success would depend on the skill of the teacher involved. Poor teachers might not make optimal use of funds for instructional resources. Furthermore, this alternative neither addresses the question of the supply of elementary teachers, nor offers a means of altering the availability of qualified teachers.

Benefit-Cost Analysis Conclusions

The benefit-cost analysis of WETEP has enumerated the expected returns from implementation of the program. This study has evaluated these benefits at three level; it has examined the impact of WETEP upon teacher preparation, elementary education and ultimate social welfare. The costs of the proposed program have been presented in a form that facilitates review of the economic efficiency of the ppogram.

Comparison of the benefits and costs of elements of WETEP reveals that the additional cost of the incremental benefits provided by WETEP in comparison with the present program is very high. The cost of the program per student increases three and one half-fold while benefits increase substantially. Justification of the program on a purely economic basis would require a set of social priorities which placed very high value on the unquantified benefits of WETEP.

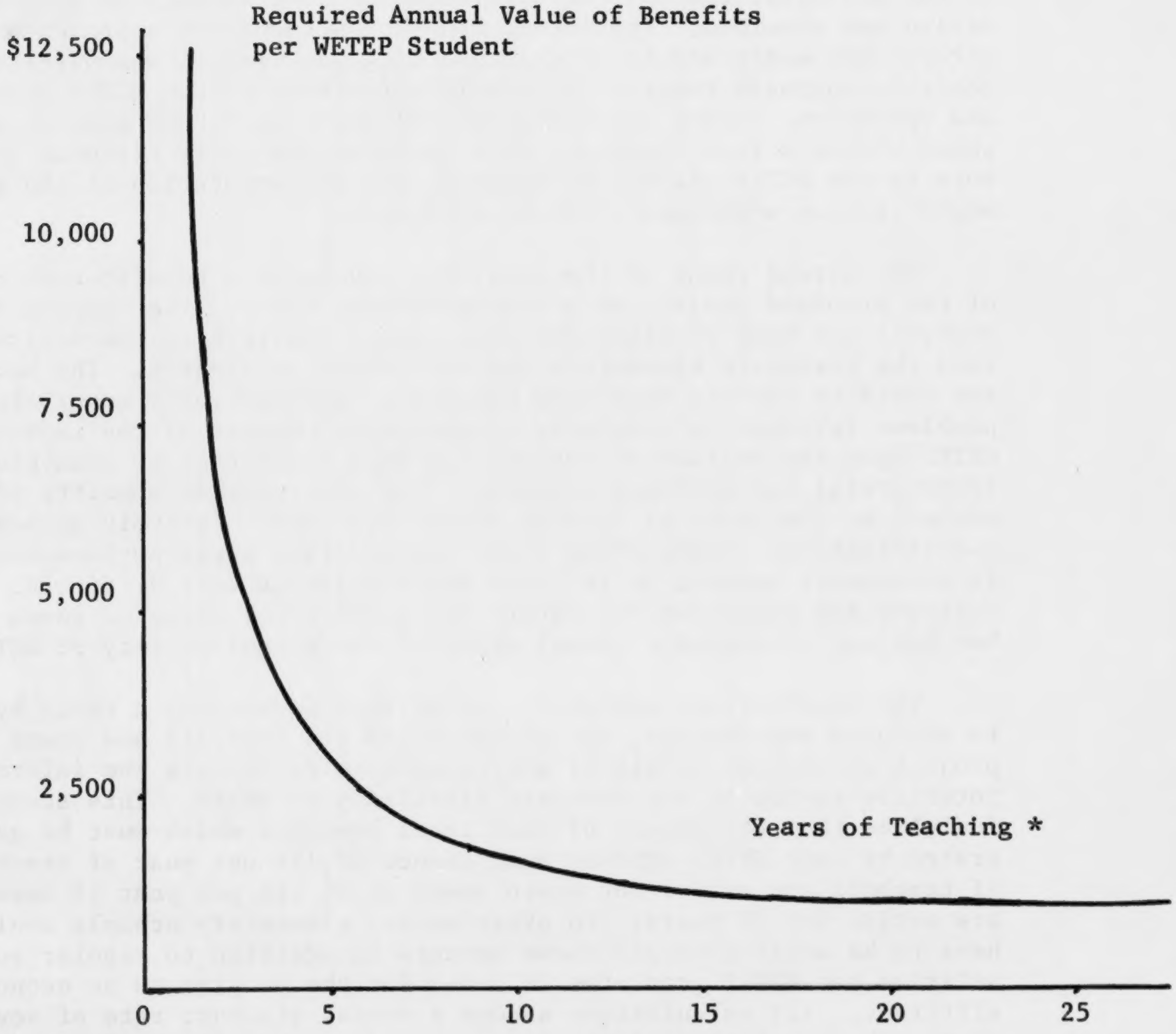
Economic Analysis Conclusions

The economic analysis of the Wisconsin Elementary Teacher Education Project has examined the social efficiency of committing public resources to development and implementation of the project. In the initial phase of the analysis, the cost-effectiveness of some aspects of program design was examined; the formal study of alternative approaches to instructional media and to program staffing was used to demonstrate the analytic approach required to attain efficiency within WETEP structure and operation. Other technological decisions have been made in this phase within a less rigorous, more informal cost-effectiveness framework by the WETEP staff. Development and implementation of the project would require additional, formal analyses.

The second phase of the study has developed a benefit-cost analysis of the proposed project on a disaggregative basis. The purpose of this analysis has been to illuminate the issues implicit in the decision to fund the Wisconsin Elementary Teacher Education Project. The benefits and costs to society have been enumerated and partially quantified. The problems involved in obtaining a dependable measure of the impact of WETEP upon the welfare of society has been confronted by examining both instrumental and ultimate benefits. The instrumental benefits of the project at the level of teacher preparation are relatively amenable to quantification. Translating these changes into pupil performance either in elementary schools or in later adult roles is very difficult. This analysis has suggested the nature and qualitative value of these benefits but has not attempted a formal study of the social utility of WETEP.

The benefit-cost analysis, rather than developing a ratio by which to evaluate the project, has systematized the benefits and costs of the project at several levels of abstraction to facilitate the informal, intuitive review of the economic efficiency of WETEP. This study indicates that the amount of additional benefits which must be generated by each WETEP student must exceed $2,176 per year of teaching if teachers are active for seven years or $1,116 per year if teachers are active for 20 years. In other words, elementary schools would have to be willing to pay these amounts in addition to regular scheduled salaries for WETEP graduates in order for the program to be economically efficient. All calculations assume a social discount rate of seven per cent. The complete analysis is presented graphically in Figure II.

One concludes from the economic analysis of WETEP that extraordinarily high values must be attached to the benefits of the program to compensate the loss inutility resulting from withdrawing resources from alternative uses and allocating them to WETEP development and operation. The social value of WETEP also depends on the extent to which the program is generalized to other teacher education institutions. The cost of developing the project is quite high; however, if the approach to teacher education is embraced by even as few as five per cent of all teacher education institutions, the cost of development on a per student basis would fall to $107.56 by 1985.



* These calculations assume that the graduate remains in elementary teaching from the date of graduation until the total years of teaching are completed. If periods of temporary leave are introduced into his career, the annual value of benefits from the program required to justify the program rises.

INCREMENTAL ANNUAL VALUE OF WETEP GRADUATES
REQUIRED FOR ECONOMIC FEASIBILITY

FIGURE 2

APPENDICES FOR VOLUME VI

APPENDIX I

Appendix I

Notes for Table II

1. The Communications Element is the most complex in the reclassification to WETEP categories. It contains parts of three courses, Curriculum and Instruction 111, 112 and 113. This results in the equivalent of 5 credits of Curriculum and Instruction plus costs for salaries from the Office of Clinical Experiences for Teachers and Supervisors which were thoroughly explained earlier.

2. The procedures for determining the costs of Mathematics Education were described in some detail in the sections, Reclassification to WETEP Elements and Orientation. Mathematics Education comprises the equivalent of 2 credits of the 10 credit sequence of Curriculum and Instruction 111 and 112. Table II describes the breakdown of instructional costs into the WETEP elements. The same procedure was used in dividing the operations and maintenance costs and the depreciation and lease costs.

3. Science Education is currently taught as are Mathematics and Social Studies; that is, it is one-fifth of Curriculum and Instruction 111 and 112 for the equivalent of 2 credits. As such, it has the same cost structure as the Mathematics and Social Studies Elements. The procedure was explained under Reclassification to WETEP Elements.

4. Social Studies for the elementary education major currently operates in the same framework as Mathematics Education. It comprises one-fifth of Curriculum and Instruction 111 and 112 for the equivalent of 2 credits. For the purpose of analysis of costs, it follows the same structure as Mathematics Education. The procedure was described under Reclassification to WETEP Elements.

5. Safety Education and other elements for which there are no cost figures listed on this form have no equivalents in the present elementary education program.

6. Health Education is presently taught as a required 3 credit course, Curriculum and Instruction 340, Health Information for Teachers. The Department instructional costs (column one) were calculated as 3 credits of Curriculum and Instruction. The per credit cost of $57.45 was multiplied by 3 to result in a total instructional cost of $172.35.

In addition, the course is taught entirely (3 credits a week) in the Multi-media Instructional Laboratory. The total operations and maintenance cost of the Laboratory was calculated by multiplying the space used, 3,989,190 square feet, which is all in a university-owned facility, by $1.441, the cost of operations and maintenance for university-owned space, which totals $5,748.42. Dividing by 33 gives a result of $174.20 which is the cost of operations and maintenance for one hour each week for an academic year. That, in turn, is multiplied by 3, the number of hours in which the Laboratory is used for this course, and then divided by 209, the number of students in the course to result in an operations and maintenance cost of $2.50 per student per year.

The depreciation cost for the Multi-media Instructional Laboratory for this course was calculated by dividing the total depreciation cost, $1,604.43 (see data in Appendix II, Table G) by 33 to arrive at the credit-hour depreciation cost of $48.62. This multiplied by 3, the number of credit hours in this course, and divided by 209, the number of students in the course, results in a per student depreciation cost of $.70.

7. Art Education for elementary majors is currently offered as one-sixth of a 6 credit course or the equivalent of 1 credit in Curriculum and Instruction 113, Preparation for Student Teaching. The operations and depreciation and lease cost were calculated as 1 credit in the Curriculum and Instruction Department. This procedure was described in some detail under Reclassification to WETEP Elements and Orientation.

8. Music Education is offered in precisely the same manner as Art Education. It is taught as one-sixth of Curriculum and Instruction 113 and calculation of its cost is based upon the cost of 1 credit in the Curriculum and Instruction Department. The procedure was explained under the section Reclassification to WETEP Elements.

9. Physical Education for elementary majors is taught as one-sixth of Curriculum and Instruction 113 or the equivalent of 1 credit, and costs are calculated accordingly. This procedure was described under the section Reclassification to WETEP Elements.

10. The Educational Psychology requirement of the current elementary education program is met by electing any two of the following 3 credit courses: Educational Psychology 100, 305, or 340, resulting in 6 credits. The cost of these credits was calculated in the same manner as the cost of Curriculum and Instruction credits, in that both the Educational Psychology Department budget and the student credit loads in Educational Psychology were used. The relative cost-ratios of credits at different levels were the same as used in Curriculum and Instruction because these ratios were calculated for the School of Education as a unit. By weighting Educational Psychology credits accordingly, the following costs per credit were calculated:

Level I (Freshmen and Sophomores)	= $25.72
Level II (Juniors and Seniors)	= 25.57
Level III (Graduate Students)	= 47.23
Special Students	= 25.57

Thus, the 6 credits an elementary education student earns in Educational Psychology incurs a cost of $153.42.

The operations and maintenance costs for Educational Psychology were calculated by multiplying the total space leased by the Department, 4,578.049 square feet by $.657, the cost for operation and maintenance per square foot of leased space and the total of university-owned space, 5,365.031 square feet by $1.441, the cost of operations and maintenance for university-owned facilities. The total of these two calculations was $10,326.76, which divided by the total number of student-credits earned in the department, 8224, resulted in an operations and maintenance cost of $1.26 per credit. For the 6 credits earned in Educational Psychology, the student incurs an operations and maintenance cost of $7.56.

Depreciation and lease costs were calculated by dividing the total depreciation and lease costs for the department, $12,523.93 (see data in Appendix II, Table E), by the total number of student-credits, 8224, to result in a per credit cost of $1.52. For the 6 credits of Educational Psychology, the total depreciation and lease cost would be $9.12.

11. The Education Policy Studies course requirement is selected from among several in the department. The cost of these 3 credits is calculated in the same manner as those in the Departments of Curriculum and Instruction and Educational Psychology. For Educational Policy Studies, the costs of credits on the various levels are:

Level I (Freshmen and Sophomores)	= $39.24
Level II (Juniors and Seniors)	= 38.75
Level III (Graduate Students)	= 71.65
Special Students	= 38.75

Thus, for a 3 credit course, the cost for a Level II student would be $116.25.

Operations and maintenance for the Department of Educational Policy Studies is calculated by multiplying the space used in university-owned buildings, 3,397.912 square feet by $1.441, the operations and maintenance cost for university-owned facilities. The result, $5,525.61, was divided by 3628, the number of student-credits in Educational Policy Studies, to result at a per credit cost for operations and maintenance of $1.52. This multiplied by 3 credits totals $4.56.

The depreciation and lease cost for Educational Policy Studies was calculated by dividing the total depreciation and least costs, $4501.17 (see Appendix II, Table D), by the number of credits, 3628, to result in a per credit depreciation and lease cost of $1.24. For 3 credits, the total would be $3.72.

12. This course is an elective for the elementary education major and can be taken in any department of the School of Education. The most common practice is to take it in the Curriculum and Instruction Department and it has been costed as a 3 credit course in that Department.

13. Preparation for student teaching is taught as a third of the 6 credit course, Curriculum and Instruction 113, for the equivalent of 2 credits. Curriculum and Instruction 113 has five elements; 1 credit each of Art, Music, Physical Education, and Speech, and 2 credits of Curriculum Planning for the student teaching experience. The former elements were all costed above (see footnotes 7, 8, and 9) and the latter 2 credits are the only ones of concern here. The cost for Instruction, Operations and Depreciation, and Lease is that for 2 credits of Curriculum and Instruction. The procedure used in breaking down these costs was described under Reclassification to WETEP Elements.

14. The office of Clinical Experiences for Teachers (CET) performs services for both University of Wisconsin students and students of cooperating institutions. The CET places students of the cooperating institutions in positions for their intern-teaching semester and sponsors a Summer Conference at which the interns meet their cooperating teacher(s) and begin preparation for the semester of internship. There were 310 interns from cooperating institutions in 1967-68 for which the CET performed these services. CET has determined that $30.00 is the cost of processing and placement of each intern for a total of $9,300. The Summer Conference cost $48,113 and of the 689 participants 310 were from other institutions. Their pro-rated share of the cost would be $21,755.88. Thus, the cost of the CET devoted exclusively to University of Wisconsin students was calculated as follows:

1967-68 Total CET Budget			$203,614.00
Subtract:	Cost for students of cooperating institutions:		
	a) processing and placing	$ 9,300.00	
	b) summer conference	21,755.88	
			31,055.88
			$172,558.12

Using this figure, the cost per University of Wisconsin student was determined as follows: The total number of Laboratory and Clinical Experiences which were coordinated and administered by CET in 1967 at the University of Wisconsin was 1,231. This number divided into the cost figure above resulted in a cost per laboratory or clinical experience of $140.18. For the purposes of this study, this cost must be applied to Curriculum and Instruction 111, 112, and the student teaching experience, in that each is coordinated by the CET, and the expenses of supervisors (but not their salaries) are paid out of the CET budget.

The square footage of CET for both maintenance and depreciation per student was calculated as follows: The square footage of the CET, 2247.631 (see Appendix II, Table A), was divided by 1,231, the number of supervised experiences, to yield a square footage of 1.826 per supervised experience. This figure multiplied by $1.441 yields the operations and maintenance cost per supervised experience of $2.63.

Depreciation costs for the Office of Clinical Experience for Teachers were calculated by dividing the annual depreciation cost of $900.73 by 1,231, the number of supervised experiences, to arrive at a depreciation cost per experience of $.73.

15. The operating cost for the Teacher Placement Bureau (TPB) was calculated as follows: The TPB essentially performs two functions. For its active registrants, the TPB seeks teaching and administrative positions. For so-called inactive registrants (people whose records are on file with TPB but who are not seeking employment directly through TPB facilities), the TPB sends credentials to potential employers whom the inactive registrants have contacted on their own. TPB personnel extimate they direct about 10 per cent of their efforts to the performance of the second of these functions. Therefore, to determine the cost of placing a teacher, the TPB budget ($110,866) was multiplied by .900 to represent the portion of their effort given to active registrants. The result ($99,779.40) was divided by 2,628, the number of active registrants in 1967-68, to result in an operating cost per active registrant of $37.51.

16. The operating cost of the Dean's Office ($150,333.04) was divided by the number of student-credits taken in the School of Education that year (53,794) to result in a per credit cost of $2.79. It was assumed that Dean's Office costs of administering undergraduate and graduate credits were equivalent. The elementary education major taking 44 credits incurred a cost of $122.76.

The per student square footage of the Dean's Office was calculated as follows: the total square footage of the Dean's Office, 6,792.974 (see data in Appendix II, Table C), was divided by the number of student-credits (53,794) to yield a square feet per credit figure of

.126. A student taking 44 credits would account for 5.544 square feet in the Dean's Office. The cost for operations and maintenance of university-owned space, $1.441 per square foot, was multiplied by 6,343.974 square feet, the space the Dean's Office occupies in university-owned facilities and the cost for operations and maintenance of leased space, $.657 per square foot, is multiplied by 44.9 square feet, the space the Dean's Office leases, to arrive at a total operations and lease cost of $9,436.66. This figure, divided by 53,794, the total number of student-credits earned in the 1967-68 academic year, resulted in an operations and maintenance cost of $.175 per credit, which multiplied by 44 credits, the number the elementary education major earns in the School of Education, resulted in a total operations and maintenance cost of $7.70.

The total 1967-68 depreciation and lease cost of the Dean's Office, $4,361.45 (see data in Appendix II, Table C), was divided by the total number of student-credits earned in that year, 53,794, to result in a per credit depreciation and lease cost of $.08. This multiplied by the 44 credits the student earns in the School of Education resulted in a per student depreciation and lease cost of $3.52.

17. The Instructional Materials Center (IMC) is used by both elementary and secondary education students in undergraduate and graduate programs. The Director of the IMC estimates that two-thirds of the use of the IMC is by elementary education students. Some of these are in graduate programs which are not of concern here. To determine the portion of elementary education students who are undergraduates, an estimate was made based upon lists of advisees, credit totals in certain courses and registration data. For the 1967-68 academic year, there were 543 undergraduates in elementary education (averaged over two semesters) and the equivalent of 233 full-time graduate students. Thus, 70 per cent of all elementary education students were undergraduates.

In 1967-68, the total budget of the IMC was $37,546.10. Multiplied by .667 (the estimated use of the facility by elementary education students) this results in a figure of $25,043.25. This is further multiplied by 70 per cent which is the percentage of undergraduates in all elementary education programs. The product is 17,530.27. Dividing by 543 yields a per student cost of $32.28.

Since undergraduate elementary education students account for 46.7 per cent of the use of the Instructional Materials Center, the total space occupied by the IMC, 5115.362 square feet (see data in Appendix II, Table F) was multiplied by .467 to arrive at the space devoted to elementary education undergraduates. The result, 2388.874 square feet was divided by 543, the number of elementary education undergraduates in 1967-68, to result in a per student space allotment of 4.40 square feet. Multiplying by $1.441, the cost for operations and maintenance of university-owned facilities, resulted in an operations and maintenance cost for each undergraduate elementary education student of $6.34.

Similarly, the depreciation and lease cost for the IMC, $1,872.03 (see data in Appendix II, Table F), was multiplied by .467 and divided by 543 to result in a per elementary education undergraduate depreciation and lease cost for the IMC of $1.61.

18. There is a one cent per student discrepancy between the totals in Tables I and II. The difference is a result of rounding figures in the reclassification.

APPENDIX II

EXPLANATION OF BUILDING NUMBER CODE

Building Number	Address or Explanation
400	Education Building
402	600 North Park
720	204 State Street
722	2218 University Avenue
749	406 North Frances
776	938 West Johnson
782	936 West Johnson
1010	606 State Street
1038	1815 University Avenue
1057	202 State Street

APPENDIX II

DEPRECIATION AND LEASE COSTS

Department	Bldg. No.	Net Area of Bldg. (Sq.Ft.)	Area in Bldg. Used by Dept.	Portion of Bldg. Used by Dept. (C/B)	Replace-ment Value of Bldg.	Annual Depreciation (E/50) or Lease	Portion of Depreciation or Lease to Dept. (DxF)
	A	B	C	D	E	F	G
TABLE A Clinical Experience for Teachers	400	69,657	2247.631	.032	$1,407,398	$28,147.96	$ 900.73
	Total Space =		2247.631		sq. ft./Total Depreciation =		900.73
TABLE B Curriculum and Instruction	400	69,657	8,095.861	.116	1,407,398	28,147.96	$3,265.16
	402	22,995	4,861.332	.211	421,629	8,432.58	1,779.27
	722	11,693	107.967	.009	lease	28,800.00	259.20
	749	1,642	1,642.000	1.000	lease	3,900.00	3,900.00
	1010	4,931.832 (one floor)	4,931.832	1.000	lease	17,500.00 /floor	17,500.00
	1038	39,478	7,794.940	.197	lease	130,080.00	25,625.76
	Total Space =		27,433.216		Total Depreciation & Lease =		$52,329.39

APPENDIX II (cont.)

Department	Bldg. No. A	Net Area of Bldg. (Sq.Ft.) B	Area in Bldg. Used by Dept. C	Portion of Bldg. Used by Dept. (C/B) D	Replacement Value of Bldg. E	Annual Depreciation (E/50) or Lease F	Portion Depreciation or Lease to Dept. (DxF) G
TABLE C							
Dean's Office, School of Education	400	69,657	6,343.974	.091	$1,407,398	$28,147.96	$2,561.46
	1057	449	449.000	1.000	lease	1,800.00	1,800.00
	Total Space	=	6,792.974		Total Depreciation & Lease	=	4,361.46
TABLE D							
Educational Policy Studies	400	69,657	3,397.912	.049	1,407,398	28,147.96	1,379.25
	1038	39,478	957.710	.024	lease	130,080.00	3,121.92
	Total Space	=	4,355.622		Total Depreciation & Lease	=	4,501.17
TABLE E							
Educational Psychology	400	69,657	608.061	.009	1,407,398	28,147.96	253.33
	722	11,693	4,578.049	.392	lease	28,800.00	11,289.00
	776	3,114	3,054.170	.981	28,154	563.08	552.38
	782	2,750	2,750.000	1.000	21,431	428.62	428.62
	Total Space	=	9,943.080		Total Depreciation & Lease	=	12,523.93

APPENDIX II (cont.)

Department	Bldg. No. A	Net Area of Bldg. (Sq.Ft.) B	Area in Bldg. Used by Dept. C	Portion of Bldg. Used by Dept. (C/B) D	Replace-ment Value of Bldg. E	Annual Depreciation (E/50) or Lease F	Portion Depreciation or Lease to Dept. (DxF) G
TABLE F Instructional Materials Center	402	22,995	5,115.362	.222	$ 421,629	$ 8,432.58	$1,872.03
	Total Space =		5,115.362		Total Depreciation & Lease =		1,872.03
TABLE G Multi-media Laboratory	400	69,657	3,989.190	.057	1,407,398	28,147.96	1,604.43
	Total Space =		3,989.190		Total Depreciation	=	1,604.43
TABLE H Teacher Placement Bureau	720	8,009	3,943.745	.492	lease	27,300.00	13,431.60
	Total Space =		3,943.745		Total Lease	=	13,431.60

APPENDIX III

APPENDIX III

Salaries of Professional Staff, Post Doctorate Interns, Research Assistants, Teaching Assistants, Consultants, and Secretarial Staff

Calculation of Salaries of Professional Staff

Salaries of the professional staff were projected on the assumption that salaries would increase in the years ahead at the average per cent of increase from 1961-62 to 1968-69. The salary for each professional level was computed separately. The increase for the professorial staff was found by calculating salaries of professors, associate professors, and assistant professors separately. The annual per cent of increase for professors was 6.08 per cent; for associate professors 5.48 per cent; for assistant professors 5.20 per cent; for instructors 5.55 per cent and 5.64 per cent for post-doctorate interns. (Salaries calculated from salaries in the State University System.) The teaching assistants salaries increased at an average annual rate of 6.49 per cent for new T.A.'s and 6.68 per cent for experienced. Project and research assistants increased at an average annual rate of 4.65 per cent. The highest annual increase of the secretarial and clerical staff was 5.77 for administrative assistants V with a low of 3.78 for clerk IV. The average annual increase for stenographer II which rank was used for computation of average secretarial and clerical salaries was 4.83.

Costs of professorial salaries were calculated on the basis of one-third of the staff at each rank, i.e., assistant professor, associate professor and professor. The average rate of salary increase for this mix was 5.62. For coordinators and directors-in-charge of support services the salaries of full professors generally were used.[1] Salaries of consultants were established on a per diem basis.

---

[1] Data derived from the formulation described in the Appendices are available in a supplementary document in the WETEP Office - School of Education, University of Wisconsin, Madison.

APPENDIX IV

APPENDIX IV

COST OF SUPPLIES AND CAPITAL EQUIPMENT

A. Cost of Supplies

Supplies as defined by the University of Wisconsin ccounting system encompasses the following items: consumable supplies and material, travel, communications, printing, equipment rental, and audio-visual production.

The cost of supplies was determined on the basis of a percentage of the total expenditure for salaries of professional staff and secretarial assistants. The formula devised for determining a percentage was an average of the per cent of salaries of professional staff and secretarial assistance expended by the School of Education and the Research and Development Center for Cognitive Learning for supplies. The expenditures of these University divisions were accepted since WETEP embraces a combination of the activities of these two organizations. This procedure differs from the pricing of supplies for development since the functions of development more closely resemble that of the Research and Development Center rather than a teaching-development function.

The average per cent of professional staff and secretarial salaries to calculate the cost of supplies was as follows:

Items	School of Education		Research and Development	
	Cost	Per Cent	Cost	Per Cent
Salaries	$ 4,649,610		$ 722,395	
Supplies	433,939	9.33	118,296	16.38
Average Per Cent		12.85		

B. Cost of Capital Equipment

Capital equipment as described in university accounting represents items which cost more than $20 and last longer than five years such as desks, typewriters, and file cabinets. In determining the anticipated cost of capital equipment for development it was decided to use the same per cent of salaries as that used in the Research and Development Center and the School of Education. In 1968-69 the expenditures were the equivalent of 1.74 per cent of the total for professional and secretarial salaries. This figure, again deviating from that used in the paper on Development, was used in calculating the capital equipment cost for WETEP.

APPENDIX V

APPENDIX V

PROCEDURES FOR CALCULATION OF SQUARE FOOTAGE OF OFFICE AND INSTRUCTIONAL SPACE, BOTH UNIVERSITY OWNED AND LEASED

A. Office Space Required

Space requirements were calculated for professors, research assistants and secretaries based on present university standards. New construction at the University generally allows 120 sq. ft. for each professor and each secretary. Following that rule, 120 was multiplied by the number of professors and secretaries to arrive at the office space requirement. A separate calculation was made of the space requirements for the research assistants for WETEP. While no general rule exists at the University of Wisconsin for space allocations for research assistants, it was decided that two full-time equivalents would be assigned the same amount of space as one professor. Since two full-time research assistants are likely to be four different people, this may appear an unsatisfactory assignment of space. However, within the concept of intensive utilization of space this allocation appears justifiable. Under this allocation each full-time equivalent would be assigned 60 square feet. This multiplied by the number of RA's provides the data for their space requirements.

B. Instructional Space

Instructional space was allocated to each element on the basis of basic WETEP time required in hours. The total number of hours (1200) was divided into the requirement of each element to give a required percentage of total instructional space. The amount of square footage total was the same for University owned or leased space.

APPENDIX VI

APPENDIX VI

CALCULATION OF COST OF OFFICE AND INSTRUCTIONAL SPACE BOTH UNIVERSITY OWNED AND LEASED

It is intended that WETEP be housed in the new education building. The square footage cost of usable space in the new building and its maintenance and operation is estimated to cost \$7.15 per square foot in 1975-76. This cost is divided between depreciation costs of \$3.745 and operation and maintenance costs of \$3.405 per square foot. This is less than leased space since the depreciation costs are assumed to be constant during the 34 years over which the building is depreciated. The cost of operation and maintenance increases each year. The projected lease costs including additional costs associated with leased space will be \$8.96 per square foot in 1975-76 for any space which must be leased.

APPENDIX VII

APPENDIX VII

EXPLANATION OF THE COST-OF-EDUCATION INDEX

In pricing the operational cost of WETEP, 1975-76, the first problem was to select an index that would adequately project future prices. Several alternatives were considered:

1. Implicit price deflators for Gross National Product for state and local government
2. Consumer Price Index
3. Commodity Price Index, Service less rent
4. Cost of Educational Index

An analysis of the four indicated that the cost of Education Index more nearly approached changes in education cost in previous years. On the assumption that this would continue in the future this index was selected. This index of educational cost increased on the average of 6.26 per cent annually for the period 1961-68. Considering a five year period only (1963-68) a higher rate was found (6.78). The seven year rate of 6.26 per cent was accepted since it modified the influence of a very high year, 1963, and provided a more extended base for the calculations.

The Cost of Education Index developed by Dr. Orlando F. Furno, Director of Research, Baltimore City Public Schools, is described in detail each year in the January issue of School Management.[2] This index was used only for those items for which a more precise basis for estimation was not available.

---

[2] School Management, Management Publishing Group, Inc., Crowell Collier and Macmillan, Inc., Greenwich, Connecticut.

APPENDIX VIII

APPENDIX VIII

STAFF RESOURCES REQUIRED FOR OPERATION OF THE WETEP PROGRAM 1975-76

This appendix sets forth the staff requirements identified for the support systems and implementation of the instructional elements. They include administrators, professorial staff, secretarial assistants, consultants, research, teaching and project assistants and technical support personnel. These staff requirements for conducting the WETEP program provided the bases for pricing needed human resources. The basis for pricing other aspects of the program are shown in other appendices.

STAFF REQUIRED FOR SUPPORT SYSTEMS

Support Systems	Professor/ Administrator	Bus. Mgr.	Sec.	Cons.[3] Days	WETEP Staff	Assistants[4]	Tech.
Assessment	4		4			8	
Faculty In-service	1.425		1.14	169	9.05	1	
Future-Planning Center	2.33		2			2.51	
Research Center	8		3			12	2
Management Systems	1		1	10		3.81	
WETEP Administration	1	1	2				

[3] Average approximately $450 per day

[4] Project, research and teaching assistants

STAFF REQUIRED FOR INSTRUCTIONAL ELEMENTS

Elements	Professor	Instructor	Intern	Assistant	Clerical
Communication					
Basic	4.0	2.45	2.45	3.9	2.97
Special	.2	.13	.13	.2	.15
In-service	.2	.06	-	.1	.087
Social Studies					
Basic	2.0	1.17	1.17	2.77	1.447
Special	.1	.1	.1	.16	.1
In-service	.2	.1	-	.07	.1
Mathematics					
Basic	2.0	1.15	1.15	2.55	1.43
Special	.1	.1	.1	.16	.1
In-service	.2	-	-	.04	.07
Science					
Basic	2.0	1.6	1.6	2.54	1.73
Special	.2	.1	.1	.04	.13
In-service	.2	-	-	.02	.07
Art					
Basic	.5	.55	.55	1.25	.53
Special	.3	.1	.1	.2	.17
In-service	.5	-	-	.05	.17
Music					
Basic	.3	.6	.6	.61	.5
Special	.4	-	-	.09	.13
In-service	.2	-	-	.05	.07
Physical Education					
Basic	.3	.43	.43	1.12	.387
Special	.1	.06	.06	.11	.073
In-service	.2	-	-	.07	.067
Health					
Basic	1.3	.55	.55	.48	.41
Special	.1	.06	.06	.08	.073
In-service	.1	.03	-	.04	.04
Safety					
Basic	.15	.1	.1	.15	.12
Special	-	-	-	.025	-
In-service	.05	-	-	.025	.017

STAFF REQUIRED FOR INSTRUCTIONAL ELEMENTS (Continued)

Elements	Professor	Instructor	Intern	Assistant	Clerical
Leisure					
Basic	.15	.1	.1	.155	.117
Special	-	.02	.03	.025	.017
In-service	.05	-	-	.02	.017
Screening					
Basic	.3	.2	-	.33	.277
Special	-	-	-	-	-
In-service	-	-	-	-	-
Orientation					
Basic	1.3	.6	.6	1.0	.83
Special	-	-	-	-	-
In-service	-	-	-	-	-
Educational Psychology					
Basic	1.2	.55	.55	2.6	.77
Special	.2	.09	.09	.325	.133
In-service	.1	-	-	.075	.033
Guidance					
Basic	.25	.35	.35	.64	.317
Special	.1	.02	.02	.09	.047
In-service	.05	-	-	.02	.017
Media and Technology					
Basic	.3	.25	.25	.6	.27
Special	.1	.02	.02	.075	.047
In-service	.1	-	-	.025	.033
Clinical Experiences					
Basic	5.0	12.2	12.2	6.29	9.73
Special	.2	.11	.11	.08	.14
In-service	.2	.03	-	.03	.077
Early Childhood					
Basic	.2	.2	.2	.175	.2
Special	.2	-	-	.05	.067
In-service	.1	.05	-	.025	.05

STAFF REQUIRED FOR INSTRUCTIONAL ELEMENTS (Continued)

Elements	Professor	Instructor	Intern	Assistant	Clerical
Culturally Diverse					
Basic	.65	.35	.35	1.12	.45
Special	.1	.09	.09	.11	.093
In-service	.25	-	-	.02	.083
Special Education					
Basic	.13	.3	.3	.47	.243
Special	.2	.1	.1	.169	.13
In-service	.2	.03	-	.025	.077